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**COMMON LARVAE OF CHIRONOMIDAE (DIPTERA)  
FROM NEW YORK STATE STREAMS AND RIVERS**  
with particular reference to the fauna of artificial substrates

KARL W. SIMPSON

and

ROBERT W. BODE

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NEW YORK  
BOTANICAL GARDEN

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New York State Museum

The University of the State of New York  
THE STATE EDUCATION DEPARTMENT  
Albany, New York

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*and*

**New England Interstate Water Pollution Control Commission  
607 Boylston Street  
Boston, Massachusetts 02116**

Bulletin No. 439

**New York State Museum**

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THE STATE EDUCATION DEPARTMENT  
Albany, New York

1980

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addenda

ADDENDA

The following article should be added to the list of references for the Diamesinae on page 28:

Hansen, D.C. and E.F. Cook. 1976. The systematics and morphology of the Nearctic species of Diamesa (Diptera:Chironomidae). Mem. Amer. Entomol. Soc. 30:1-203.

We have also discovered (thanks to Dave Beckett of the University of Cincinnati) that we have at least three species of Parachironomus that will key out with P. abortivus on page 13. The following substitution for couplet 8 on page 13 will help to separate these taxa. More complete keys and larval descriptions may be found in Beck and Beck (1969).

- 8a. Median tooth of labial plate pointed.....8b  
Median tooth of labial plate cleft..Parachironomus frequens (p..76)
- 8b. Lateral margin of labial plate serrated; 3rd antennal segment shorter than 4th.....Parachironomus carinatus?  
Lateral margin of labial plate smooth.....8c
- 8c. Penultimate tooth of labial plate usually longer than both adjacent teeth; pecten epipharyngis with 5-9 teeth of unequal size.....  
.....Parachironomus hirtalatus?  
Penultimate tooth of labial plate not noticeably longer than : adjacent teeth; pecten epipharyngis composed of 3 large, nearly equal sized teeth.....Parachironomus abortivus (p. 75)

Parachironomus abortivus remains the most common and widely distributed species and the discussion of its distribution and ecology on page 75 needs no alteration. This species will key to P. monochromus in Beck and Beck (1969) but differs in that the 3rd and 4th antennal segments are subequal in length (in P. monochromus the 4th segment is longer than the 3rd). We have reared P. abortivus and are therefore certain that the larva pictured on page 75 is accurately identified.

The two additional species will key in Beck and Beck (1969). We are not certain of the species identifications because we have no reared specimens. Parachironomus carinatus? occurs in clean and mildly enriched streams. Parachironomus hirtalatus? appears to occur only in severely polluted waters, often in the same communities as Dicrotendipes nervosus Type II (page 68).



## **ABSTRACT**

Taxonomic and biological information is presented for 71 taxa of midge larvae (Diptera: Chironomidae) commonly collected from artificial substrate samplers throughout New York State streams, rivers and canals. The following information is included for each taxon: photographs of important distinguishing characters; lists of generic and specific characters; a discussion of the taxonomic status; notes on the distribution and ecology, especially in relation to water quality; references where additional information is available. Tables are included to indicate where the taxa will key in four existing larval keys.

The value of midge larvae in water quality evaluations and methods for improving larval taxonomy are also discussed.

## ACKNOWLEDGMENTS

Collecting, sorting, and rearing of material was aided by Larry Abele, Ray Gabriel, Rickey Graham, and Ron Nelsen. The determinations by and discussions with the following taxonomists were invaluable: Dr. Paula Albu and Dr. J. E. Sublette, Eastern New Mexico University, Portales, NM; Dr. W. P. Coffman, University of Pittsburgh, Pittsburgh, PA.; Dr. D. R. Oliver, Entomological Research Institute, Ottawa, Ontario, Canada; and Dr. S. S. Roback, Academy of Natural Sciences, Philadelphia, PA.

The financial support of the New England Interstate Water Pollution Control Commission for production of this publication is gratefully acknowledged. The biomonitoring project from which this work evolved is funded by the U.S. Environmental Protection Agency under section 106 of the Water Pollution Control Act and its subsequent amendments.

The manuscript was reviewed by Drs. G. W. Fuhs, E. Horn, C. Pagel, S. S. Roback and J. E. Sublette.

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## INTRODUCTION

This bulletin is a guide to midge larvae (Diptera:Chironomidae) commonly encountered during water quality studies of New York State streams, rivers and canals. It includes keys for identifying the taxa, tables for synonymizing the names with those used in some other references, plus biological and taxonomic summaries for each of 71 taxa.

Midge larvae hold great potential for helping to evaluate water quality, due to their widespread distribution in most freshwater habitats and their varied habits and environmental requirements. They belong to the loose grouping of organisms known as macroinvertebrates, which are often chosen for biomonitoring of flowing waters because of their relative immobility, their relatively stable population dynamics, and their sensitivity to environmental disturbances (Cairns and Dickson, 1971; Gaufin, 1973; Goodnight, 1973).

Unfortunately, correct identification of the larvae is a time-consuming and often frustrating process. In many genera, the larvae of the different species are either so similar to one another or have not been adequately studied to allow identification to the species level. In addition, generic limits and nomenclature have undergone so many changes that a particular organism will often lead to different determinations, depending on the reference used for identification (for some examples, see pp. 102-105). Fortunately, taxonomy is now stabilizing and fewer changes should occur in the future.

In 1972, New York State initiated a biomonitoring project whose main objective is to evaluate the biological health of the State's major rivers and canals. Artificial substrates were chosen to obtain quantitative samples of macroinvertebrates because of their ability to standardize such important sampling variables as substrate type, surface area, and depth. Although these devices have certain limitations and may not be as effective as other methods for studying small streams (Roby, Newbold and Erman, 1978), we feel that they are an effective method for comparing the fauna at different times and places in moderate and large-sized rivers. The use of artificial substrates for biomonitoring has been discussed by Beak et al. (1973) and Stanford and Reed (1974).

Since 1972, artificial substrate samples have been collected from about 225 locations throughout New York State (Fig. 1), embracing a wide variety of water quality conditions. Nearly half of the more than 500,000 macroinvertebrates that have been collected are chironomid larvae (Table I). To date, about 150 taxa of midge larvae have been identified, less than half of which occurred at five or more sampling sites. The 71 taxa included in this publication have been found at five or more sites, and collectively comprise over 90% of all chironomids collected.

This work is intended primarily to aid in the identification of common midge larvae from streams, rivers and canals, and also to help utilize biological information regarding these organisms in the interpretation of biomonitoring data. The organisms included represent a small portion of the total chironomid fauna of New York, due to the specialized sampling method and the restricted number of habitat types sampled. A great many larvae collected from standing waters, small streams, and from bottom samples in large rivers may not be included.

## TAXONOMY

### The need for accurate identifications

Species identifications provide the most accurate measure of biological conditions, regardless of the approach used in data interpretation. If indicator organisms are used, accurate identifications are needed because even closely related species may have quite different environmental requirements (Curry, 1965; Roback, 1974). Accurate identifications also increase the sensitivity of community structure indices such as diversity, species richness, equitability, and similarity coefficients.

Of course, the more severe the pollution problem, the easier it is to detect the biological consequences. Gross pollution affects the biota so drastically that changes can be detected at the generic, family, or even ordinal level. But as waste treatment facilities are completed and the severity of pollution decreases, greater precision is needed to assess accurately the extent to which the biota are being protected. This has a direct bearing on the main objective of the Water Pollution Control Act and its subsequent amendments which is "to restore and maintain the

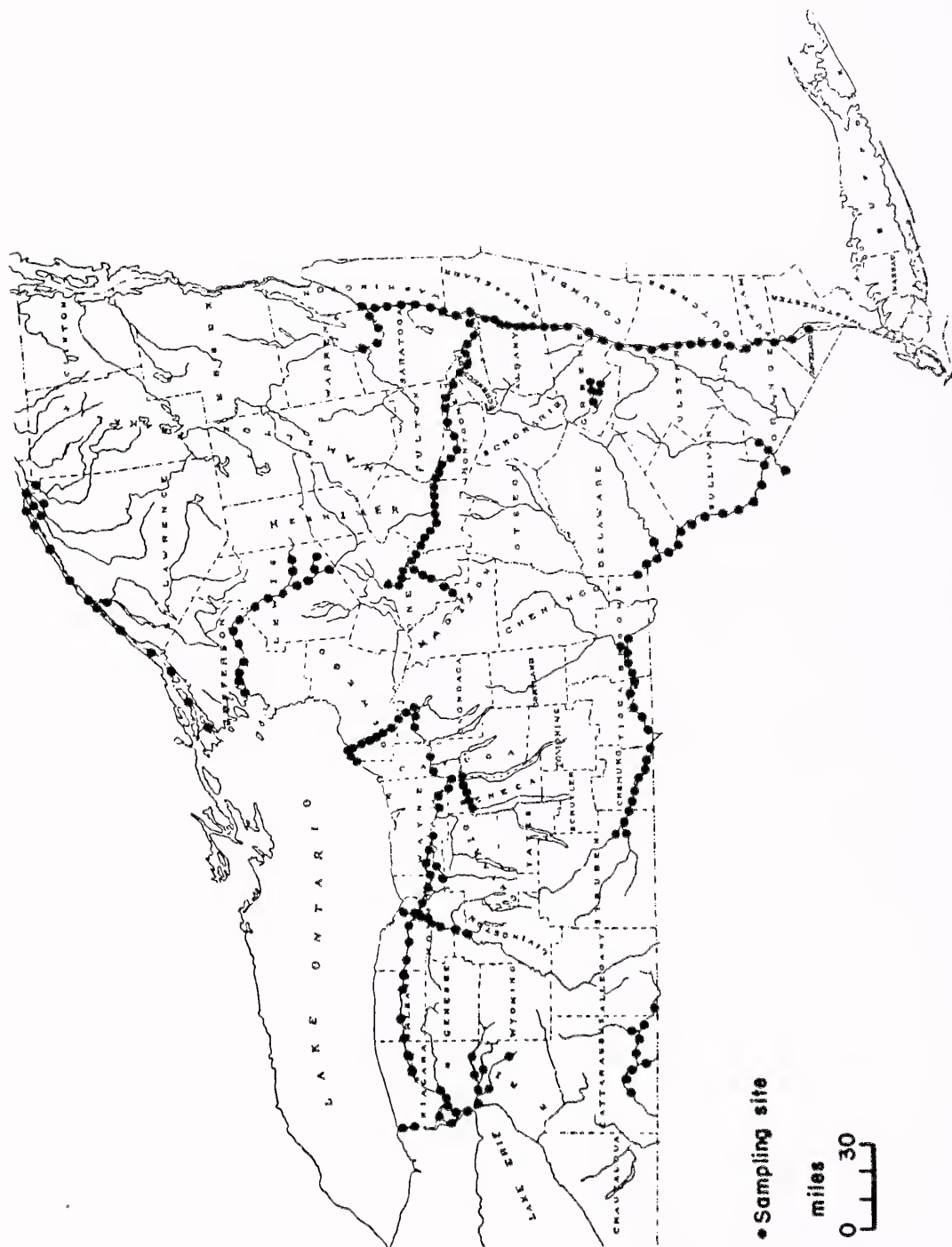


Figure 1. New York State Biomonitoring Network (1972-1977)

**Table I — Occurrence of Midge Larvae (Diptera, Chironomidae) in Quantitative Samples Collected During New York State's Biological Stream Monitoring Project, 1972-1977.**

| Year   | Stream or River Reach                                                       | No. of Stations | Samples Processed | Total No. Organisms | Total No. Midges* | % Midges |
|--------|-----------------------------------------------------------------------------|-----------------|-------------------|---------------------|-------------------|----------|
| 1972   | Upper Hudson River from Corinth to Troy                                     | 12              | 36                | 10,651              | 7,802             | 73       |
|        | Mohawk River from Rome to Cohoes                                            | 28              | 82                | 21,025              | 7,732             | 37       |
|        | Oriskany Creek from Oriskany to Mohawk River                                | 5               | 15                | 4,489               | 2,344             | 52       |
|        | Seneca-Oswego River System from Baldwinsville to Oswego                     | 14              | 36                | 39,382              | 8,147             | 21       |
| 1973   | Lower Hudson River from Troy to Nyack                                       | 26              | 54                | 22,326              | 11,438            | 51       |
|        | Susquehanna River from Binghamton to Waverly                                | 10              | 30                | 45,464              | 25,193            | 55       |
|        | Chemung River from Painted Post to Waverly                                  | 10              | 20                | 13,741              | 5,886             | 43       |
| 1974   | Genesee River from Avon to Lake Ontario                                     | 8               | 24                | 28,142              | 19,871            | 71       |
|        | New York Barge Canal System from Rochester to Weedsport                     | 19              | 55                | 99,272              | 58,978            | 59       |
|        | Delaware River from Deposit to Port Jervis                                  | 16              | 39                | 29,243              | 15,149            | 52       |
| 1975   | Schoharie Creek near Tannersville                                           | 5               | 25                | 16,969              | 12,234            | 72       |
|        | Allegheny River from Portville to Salamanca                                 | 9               | 24                | 19,142              | 11,225            | 59       |
|        | New York State Barge Canal from Buffalo to Rochester                        | 12              | 34                | 19,257              | 3,573             | 19       |
| 1976   | Niagara River from Buffalo to Youngstown                                    | 10              | 24                | 7,941               | 5,342             | 67       |
|        | Buffalo River in Buffalo and suburbs                                        | 7               | 16                | 19,698              | 11,628            | 59       |
|        | Black River from Port Leyden to Lake Ontario                                | 17              | 50                | 90,359              | 25,506            | 28       |
| 1977   | St. Lawrence River from Cape Vincent to below Massena                       | 18              | 48                | 32,684              | 8,756             | 27       |
|        | Hudson River from Corinth to Kingston (repeated from 1972 and 1973 surveys) | 9               | 26                | 42,315              | 27,225            | 64       |
| Totals |                                                                             | 235             | 638               | 564,100             | 268,029           | 48       |

\* Because of subsampling, only about 25% of the midges tabulated have been mounted and identified.

physical, chemical, and biological integrity of the Nation's waters" (Section 101(a)). The biological integrity of the water cannot be adequately evaluated without accurate determination of the resident organisms.

The need for species-level determinations is well summarized by Resh and Unzicker (1975). "The time and effort spent on identifying specimens' genus and in developing endless and often meaningless faunal lists for environmental impact statements should be shifted to associating immature and adult aquatic insects and to developing identification keys. If this were done, the species lists prepared in the future would not merely be taxonomic exercises but valuable tools in the biological assessment of water quality."

### **Present status of larval taxonomy of the Chironomidae**

The present scheme of chironomid taxonomy as outlined by Coffin (1978) divides the family into approximately 140 genera, substantially more than are included in existing larval keys. Early British and American taxonomists recognized very large genera with subdivisions (subgenera and groups) and numerous species, whereas their European counterparts established more genera, each containing fewer species. The European scheme is gaining wider acceptance with North American workers and, therefore, some Nearctic genera have been split into a number of smaller genera. Quite often the subgeneric and group names used by Johannsen (1937a, 1937b) and Roback (1957) are now given full generic status.

There is no larval key that contains all the generic names listed by Hamilton et al. (1969) and Coffin (1978), although one is being prepared by leading taxonomists and may be available in the next few years. For many chironomids (except many Orthocladiinae and Tanytarsini) pupae and adults can be identified. Therefore, the best way to obtain better determinations of larval material is to associate the larvae with the pupal or adult stage (see pp. 5,8). Frommer (1967) provides a good introduction to adult taxonomy.

### **Use of chironomid larvae in data interpretation**

As mentioned previously, the utilization of specific tolerance limits for chironomid larvae is limited because most species cannot be identified with certainty. Chironomids should prove to be quite valuable once taxonomy is improved and environmental requirements are defined at the species level. However, chironomids can be used presently to enhance biomonitoring data. Basic life history information for species, species groups, or even genera can often reveal important traits about the water from which the organisms were collected.

Our approach to data interpretation involves synthesizing information provided by various community structure indexes with life history information for the resident organisms. Basically, the indexes are used to detect stresses, and the life history information is used to determine the general nature of the stress. When parameters such as Shannon-Wiener diversity, equitability and species richness are all high, a healthy (unstressed) community is indicated. The application of these indexes to water quality studies is described by Weber (1973) and Wilhm (1972).

Stressed communities are usually recognizable by one or more of the following: low diversity, low equitability, low species richness, high number of individuals. If a community is considered to be under stress, its numerically important organisms are identified and information concerning their basic habits is used to help define the nature of the problem. This procedure is followed for all macroinvertebrates, but chironomids are frequently involved.

For example, low equitability and high numbers of individuals when accompanied by high densities of saprophilic species such as *Glyptotendipes lobiferus* or *Dicortendipes nervosus* indicate excessive amounts of decomposable organic matter. Dominance of the fauna by members of the *Rheotanytarsus exiguus* group is indicative of habitats with moderate to swift flow and high concentrations of suspended organic particulates (see p. 90). When species such as *Cricotopus bicinctus*, *Nanocladius distinctus* or *Parachironomus abortivus* are most abundant (usually accompanied by low species richness), a nonorganic factor is usually involved. Possible causal factors include the presence of toxic substances, or alterations in physical factors such as temperature and flow. As more data become available, it may be possible to equate the dominance of a particular species or aggregate of species with more precise physical and chemical factors.

In conclusion, basic life history information for the dominant organisms in macroinvertebrate communities can greatly enhance the information generated from biomonitoring studies. This information is particularly useful in stressed situations, where it may help define the general nature of the problem.

## METHODS

### Collection of biomonitoring samples

Collection and preservation methods generally follow recommended procedures in Weber (1973) and the fourteenth edition of Standard Methods (American Public Health Association, 1976, Section 1005). The device used to sample macroinvertebrates quantitatively was a modification of the Hester-Dendy multiple-plate sampler. Each sampler consisted of three plates, 6 inches (15.2 cm) square, mounted on a No. 13 aluminum turnbuckle (Fig. 2). The top two plates were kept  $\frac{1}{8}$  inch apart with one  $\frac{1}{8} \times 1 \times 1$  inch hardboard spacer; the bottom two,  $\frac{3}{8}$  inch apart with three such spacers. Each sampler was suspended in the water column three feet (0.9 meters) beneath the water surface for a period of five weeks.

In navigable rivers, the samplers were hung from existing navigation buoys (with permission from the proper agency). In nonnavigable sections, a  $\frac{1}{2}$  gallon polyethylene jug stuffed with styrofoam packing material served as a float and a 4 x 8 x 16 inch concrete block was the anchor (Fig. 3). All connections were made with  $\frac{1}{8}$  inch plastic-coated cable, secured with common cable clamps. Brass swivel snaps were used to facilitate sampler removal and replacement.

Each station was sampled three times between July and October of the respective year. Labels reading "NYSD HEALTH POLLUTION SURVEY DO NOT DISTURB" were attached to each device and seemed to discourage vandalism. Loss of samplers due to washout or vandalism was less than 10%.

During retrieval, the samplers were disassembled, thoroughly cleaned, and the silt removed from the sample with a No. 30 sieve. Samples were preserved with 70% ethanol to which rose bengal stain (a sorting aid) had been added (Mason and Yevich, 1967).

### Mounting chironomid larvae

After being picked from the sample, chironomid larvae were sorted into groups based on the location of eyespots, shape of the head, possession of ventral tubules, etc. They were then cleared in a warm solution of 10% potassium hydroxide, rinsed in distilled water, then in 95% ethanol, and mounted in Diaphane (no longer available) or Euparal (Thomas Scientific Supply Co., Philadelphia). Beck (1976, pp. 19-22) describes some other methods for mounting the larvae.

### Special problems in the identification of larvae

Some field-collected larvae simply cannot be identified. Early-instar larvae may differ from mature specimens so drastically that they do not fit the description for their own taxon. On other specimens, taxonomically important structures such as the labial plate and the mandibles are so badly abraded that the specimens cannot be determined. For quantitative studies, an attempt can be made to correlate unidentifiable specimens with mature, undamaged specimens from the same sample.

The process of clearing and mounting the larvae, while necessary for examining many important characters, also makes others difficult to see. Membranous structures such as the Lauterborn organs and the antennal blade become very faint after treatment in warm KOH. Overnight clearing in cool (room temperature) KOH is less damaging and will make these structures more visible. Another more expensive alternative is to examine the cleared specimens with a phase contrast microscope. The anal and ventral tubules, preanal papillae, eyespots, and body coloration are lost or very difficult to see once the specimen is cleared and mounted. They are easily observed under a dissecting microscope before the specimen is cleared.

### Techniques for associating life history stages

The most desirable procedure for associating larvae with their respective pupae and adults is by rearing. A successfully reared individual yields all the larval, pupal, and adult characters for that particular species.

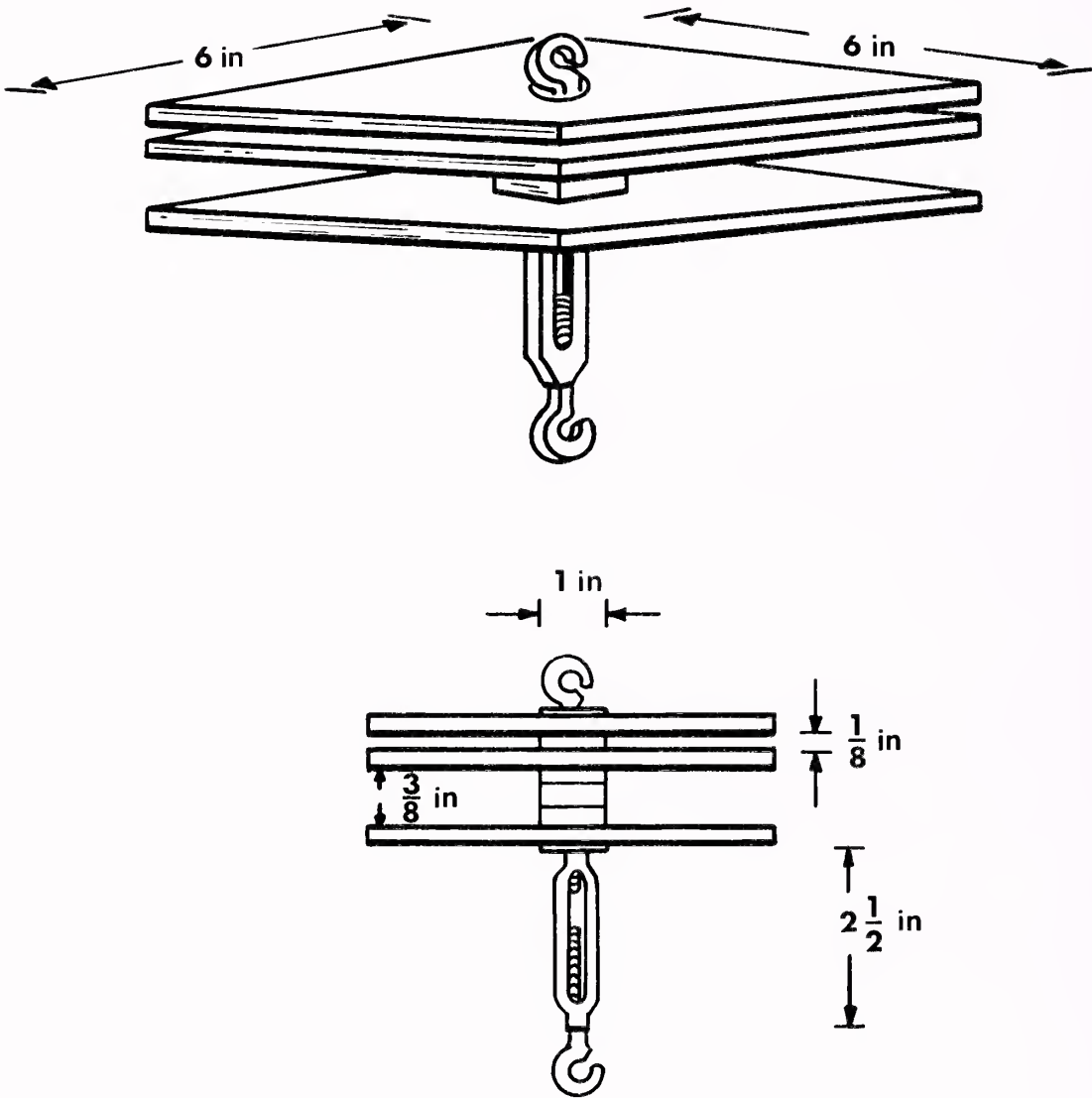
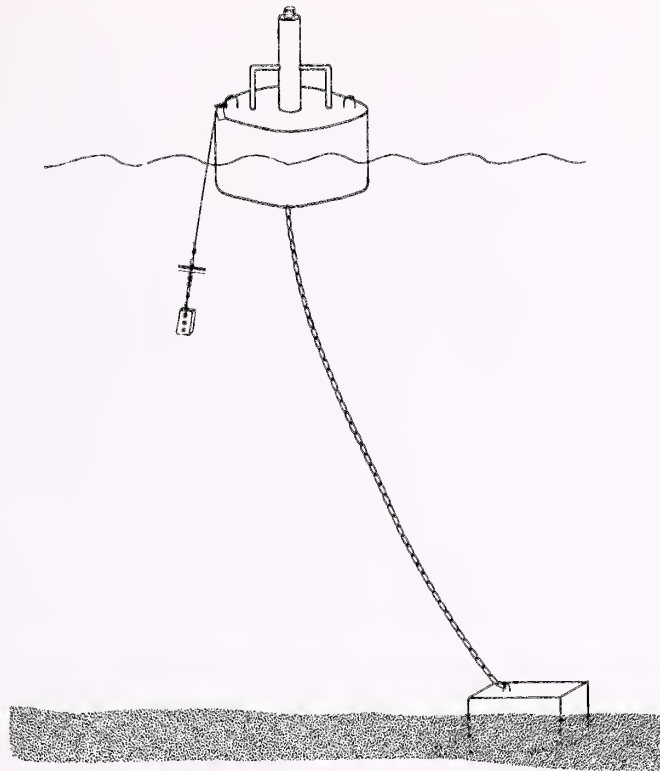
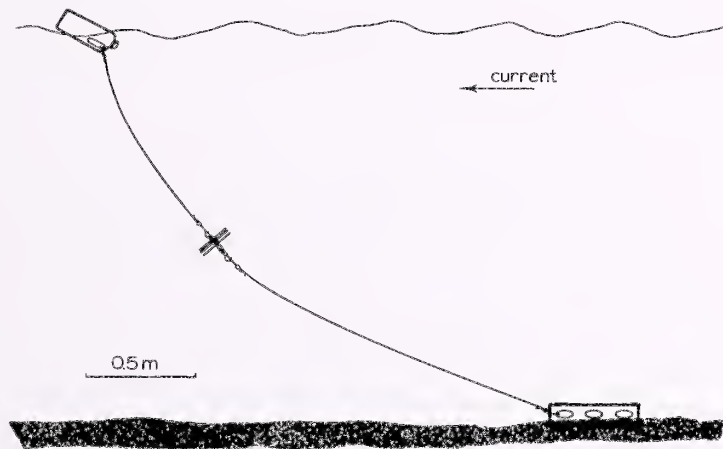


Figure 2. Multiple-Plate Sampler



a. Buoy (navigable waters)

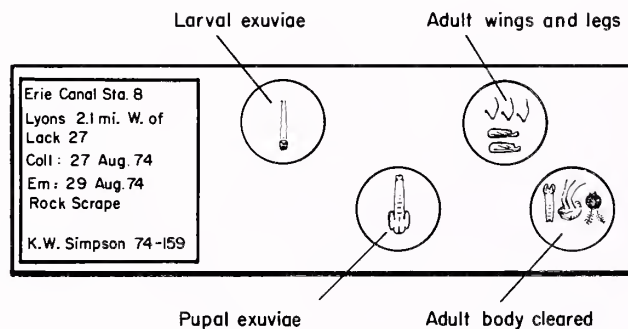


b. Float (nonnavigable waters)

**Figure 3. Sampler Installment**

Our basic rearing technique essentially follows the procedures described by Roback (1976, pp. 169-173). In brief, a single larva is placed in a small glass container (vial or test tube) with distilled water. Each container is sealed with a styrofoam plug, placed in a rack with other rearings, and kept at 15-20° C, whenever possible. The organisms are examined daily, and emerged adults are knocked into the water with a squirt of alcohol, then the larval exuviae, pupal exuviae and adult are preserved in 70% ethanol.

All stages of a reared individual are mounted on the same microscope slide using small (12 mm diameter) round coverslips. The larval and pupal exuviae are rinsed well in 95% ethanol, and then mounted under separate coverslips as shown below. Both wings and the legs from one side of the adult are removed, rinsed in 95% ethanol, and mounted under a third coverslip. The rest of the adult is cleared in a warm solution of 10% KOH, rinsed in distilled water, then in 95% ethanol and mounted under a fourth coverslip. The head, thorax and abdomen are separated either before, during or after the clearing process. The head is mounted anterior end up, the thorax laterally, and the abdomen ventral side up. Special care should be taken to mount the genitalia properly. They may be maneuvered and spread slightly by applying gentle pressure to the coverslip.



The method described above is appropriate for a general approach to rearing, but may not be effective for rheophilous species. More specialized rearing techniques may be attempted if there is a strong interest in these species (Becker, 1973; Bjarnov and Thorup, 1970; Craig, 1966; Hartman, 1965; Mason and Lewis, 1970; Provonsha and McCafferty, 1975; Schneider, 1967; Whitford et al., 1964).

Life history stages can also be pieced together through the use of mature larvae and mature pupae contained in preserved samples. During the routine process of sorting and identifying samples, look for larvae with a swollen thorax and also 2 dark spots in the head or thorax, which are the developing compound eyes of the pupa. These specimens are termed prepupae — mature larvae that are nearly ready to pupate, and on which the diagnostic characters of the pupa are often discernible. Prepupae can be cleared and mounted the same as larvae, and the specimen may be determined using larval keys, pupal keys, or both.

Pupae are also taxonomically valuable and should be carefully examined during routine sample processing. In some species the larval skin (exuviae) often remains attached to the pupa, thereby yielding larval/pupal associations. In addition, mature male pupae may have the genitalia of the developing adult sufficiently hardened to permit species recognition using the appropriate keys for adults. Because other important features of the adult (e.g. wing venation, location and size of bristles) are not visible in the pupal stage, reared material is still preferable.

## USE OF THIS PUBLICATION

### Morphological terminology

There are several sets of terms used for some of the most important structures used in larval taxonomy. For example, the terms labial plate, hypostomial plate and mentum all refer to the same structure. The terms used in this publication are shown on figures 4 and 5. The terms were chosen to be compatible with most existing larval keys.

## Information presented in the inventory

At the top of each taxon's sheet are photographs showing the important diagnostic characters for that larva. These invariably include the head capsule, and may also include parts of the thorax and abdomen, as well as close-ups of various structures on the head. Some of the photographs of pale structures such as antennae, Lauterborn organs, claws of the prolegs, and various pale setae have been taken through a phase contrast microscope. These structures will not be as clearly seen through a conventional (bright field) compound microscope.

Beneath the photographs are listings of the characters used for determining the taxon: *Generic Characters* on the left, and *Specific Characters* on the right. The specific characters sometimes apply to species groups, which contain several species.

The *Taxonomic Status* section tells whether or not the larva can be identified with some degree of certainty using existing keys. When the larva cannot be keyed, references are given (whenever possible) where the pupa and/or adult can be determined. The ratings poor, fair, and good have the following connotations:

Good. Species identification of the larva with existing keys appears to be sound.

Fair. Species identification of the larva may be attempted, but existing keys are incomplete and the resultant determination may actually include several species. Larval identification should be verified by determining pupae or adults. Keys for these latter stages are generally available.

Poor. Literature is lacking for pupae and adults, therefore precise determinations cannot be made even with associated material *and/or* there are no known characters for separating the genus of the larva from closely related genera.

Under the *Distribution and Ecology* section, the distribution throughout our sampling network is given, including a consideration of the taxon's occurrence in relation to physical traits (especially current speed) and general water quality. Observed responses to organic and toxic wastes are given. Some ecological information from the literature is also given, including habitat preferences, feeding habits, and chemical extremes for waters in which the organisms have been found.

At the bottom of each page the main *References* are listed that contain pertinent information for the genus and/or species. In cases where there is little or no literature concerning the North American fauna, references for the European fauna are given. While these references may not contain most of the Nearctic species, they will provide an introduction to the important diagnostic characters for the group and should aid in the separation of species.

## KEYS TO TAXA INCLUDED

The keys that follow are intended as an aid to help determine whether or not a particular larva is included in this bulletin. As previously mentioned, this compilation is very restricted and there are many larvae that are not included. Whenever possible, couplets have been given that eliminate larvae that are not included.

Once the specimen has been determined, it should be carefully checked against the generic and specific characters given for that taxon. If the generic characters apply but the specific characters do not, some of the references on the taxon's sheet may provide some taxonomic and biological information for the specimen in question.

## MAJOR SUBDIVISIONS

1. Ligula present; antennae retractile .....Subfamily Tanypodinae (p. 10)  
Ligula absent; antennae not retractile .....2
2. Premandibles absent .....Not included (Subfamily Podonominae)  
Premandibles present .....3
3. 3rd antennal segment annulate .....Subfamily Diamesinae (p. 11)  
3rd antennal segment not annulate .....4
4. Paralabial plates striated .....Subfamily Chironominae 5  
Paralabial plates, if present, not striated although they may be  
wrinkled or bear setae .....Subfamily Orthocladiinae (p. 11)
5. Antennae arise from tubercles on head that are longer than wide .....Tribe Tanytarsini (p. 15)  
Antennae usually sessile, if on tubercles, these are not longer than wide  
.....Tribe Chironomini (p. 13)

## TANYPODINAE

1. Ligula with 5 teeth .....2  
Ligula with 4, 6 or 7 teeth .....13
2. Anterior margin of ligula convex or flat .....3  
Anterior margin of ligula concave .....7
3. Anterior margin of ligula flat .....4  
Anterior margin of ligula convex, the median tooth longer than the 1st  
lateral teeth .....5
4. All claws of posterior proleg simple; supra-anal bristles arise from  
distinct papillae .....*Pentaneura* (p. 25)  
Posterior proleg with at least one bifid claw and/or supra-anal bristles  
sessile .....Not included (*Zavreliomyia*, *Paramerina*, *Larsia*)
5. Abdomen with lateral hair fringe .....Not included (*Tanypus*)  
Abdomen without lateral hair fringe .....6
6. Each posterior proleg with 1 bifid claw, antennal ratio 2.0-2.5, 2nd  
antennal segment darker than 1st .....*Labrundinia* (p. 22)  
Each posterior proleg with 1 pectinate claw; antennal ratio 3.0, 2nd antennal  
segment not darker than 1st .....*Nilotanypus* (p. 24)
7. Maxillary palps with 2 or more basal segments .....*Ablabesmyia* 8  
Maxillary palps with only 1 basal segment .....10
8. Posterior proleg with 2-3 dark claws; maxillary palps with 5 basal  
segments .....*Ablabesmyia mallochi* (p. 20)  
With other characters .....9
9. Posterior proleg with 2 dark claws; maxillary palps with 3 basal  
segments .....*Ablabesmyia parajanta* (p. 21)  
With other characters .....Other *Ablabesmyia* (See Beck, 1976)
10. Body with hair fringe, paralabial combs conspicuous .....*Procladius* (p. 26)  
Body with at most scattered hairs; paralabial combs indistinct .....11
11. Abdomen with scattered hairs; 1st lateral tooth of ligula curved laterally;  
mandible with only minute inner tooth .....*Thienemannimyia* group (p. 27)  
Abdomen without hairs; ligula and mandible variable .....12
12. Antenna about  $\frac{1}{3}$  as long as head; head about 1.2 times as long as wide .....*Natarsia* (p. 23)  
Antenna about  $\frac{1}{2}$  as long as head; head more than 1.8 times as long  
as wide .....Not included (*Guttipelopia*, *Larsia* — see Oliver et al., 1978)
13. Ligula with 4 teeth .....14  
Ligula with 6 or 7 teeth .....15
14. Ligula with 4 pale teeth .....Not included (*Psectrotanypus*)  
Ligula with 4 black teeth .....Not included (*Djalmabatista*)
15. Ligula with 6 teeth .....Not included (*Clinotanypus*)  
Ligula with 7 teeth .....Not included (*Coelotanypus*)

## DIAMESINAE

1. Labial plate with a broad, light median tooth and 8-9 pairs of dark lateral teeth ..... *Sympotthastia* sp. (p. 30)
- Labial plate pale and toothless ..... *Potthastia longimanus* (p. 29)

## ORTHOCLADIINAE

All larvae in this key are free-living, possess paired anterior and posterior prolegs as well as preanal papillae.

1. Antenna at least  $\frac{1}{2}$  as long as head, 2nd and/or 3rd segments often dark ..... 2
- Antenna shorter, usually less than  $\frac{1}{2}$  as long as head ..... 5
2. Antenna 4-segmented, longer than head; spur of posterior proleg plumose ..... *Corynoneura* 3
- Antenna 5-segmented, shorter than head; spur of posterior proleg simple ... *Thienemanniella* 4
3. (Only 2 species are included here, see Roback (1957) for a more complete key)
- Spur of posterior proleg with spurs along its shaft ..... *Corynoneura celeripes* (p. 34)
- Spur of posterior proleg without hairs along its shaft, but with fine bristles at base of shaft ..... *Corynoneura taris* (p. 35)
4. (Only 2 species are included here, see Roback (1957) for a more complete key)
- Middle tooth of labial plate small and recessed between 1st laterals; 2nd antennal segment yellow ..... *Thienemanniella* nr. *fusca* (p. 60)
- Middle tooth of labial plate nearly as long as 1st laterals; 2nd antennal segment dark brown ..... *Thienemanniella* prob. *xena* (p. 61)
5. Largest teeth of labial plate separated by a wide gap or by a small recessed tooth; 1st antennal segment slightly but distinctly curved; 2nd antennal segment much shorter than 3rd segment ..... *Brillia* (p. 32)
- With other characters ..... 6
6. Abdomen with multi-rayed setae; labial plate with stellate bristle near each posterolateral margin ..... *Synorthocladus* (p. 59)
- Abdominal segments without multi-rayed setae, but may have strong simple hairs or hair pencils ..... 7
7. Antenna with 6 or 7 segments, 6th or 7th segment sometimes hair-like and difficult to see; median tooth of labial plate often notched laterally .... *Parakiefferiella* (p. 55)
- Antenna with 4 or 5 segments; labial plate variable ..... 8
8. Paralabial plates conspicuous and bearing setae ..... 9
- Paralabial plates variable, but not bearing setae ..... 10
9. Labral seta I bifid; posterolateral margin of paralabial plate rounded ... *Rheocricotopus* (p. 58)
- Labral seta I palmate; posterolateral margin of paralabial plate truncate or angular, rarely rounded ..... *Psectrocladius* (p. 57)
10. Paralabial plates large and conspicuous and usually wrinkled; middle area of labial plate light and with two small peaks ..... *Nanocladius* 11
- Paralabial plates if conspicuous, are not wrinkled; labial plate not as above ..... 15
- (Couplets 11-14 are a partial key for *Nanocladius*, condensed and modified from Saether (1977)).
11. Antennal ratio 1.7-2.0; paralabial plates heavily rugose; length of 1st antennal segment 58-60  $\mu$  ..... *Nanocladius distinctus* (p. 48)
- Antennal ratio less than 1.7, 1st antennal segment usually shorter than 58  $\mu$  ..... 12
12. Antennal ratio 1.5; claws of anterior prolegs apparently smooth; gular length 136-144  $\mu$  ..... *Nanocladius minimus*? (p. 49)
- Antennal ratio 1.1-1.4; some claws of anterior prolegs at least weakly pectinate ..... 13
13. Claws of anterior prolegs strongly pectinate; gular length 132-151  $\mu$ ; length of 1st antennal segment 34-38  $\mu$  ..... *Nanocladius spiniplenus* (p. 51)
- Claws of anterior prolegs weakly to strongly pectinate; gular length 144-177  $\mu$ ; length of 1st antennal segment 41-58  $\mu$  ..... 14

|                                                                                                                                                                                                                                      |                                                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| 14. Length of 1st antennal segment 41-46 $\mu$ ; gular length 144-151 $\mu$ ; claws of<br>anterior prolegs weakly to moderately pectinate .....                                                                                      | <i>Nanocladius crassicornus</i> (p. 47)           |
| Length of 1st antennal segment 46-58 $\mu$ ; gular length 175-177 $\mu$ ; claws of<br>anterior prolegs moderately to strongly pectinate .....                                                                                        | <i>Nanocladius rectinervis</i> (p. 50)            |
| 15. Labial plate with 11 or 12 teeth .....                                                                                                                                                                                           | 16                                                |
| Labial plate with 13 or more teeth .....                                                                                                                                                                                             | 24                                                |
| 16. Labial plate with 11 teeth, usually very dark .....                                                                                                                                                                              | 17                                                |
| Labial plate with 12 teeth .....                                                                                                                                                                                                     | 20                                                |
| 17. 1st and 2nd lateral teeth of labial plate small and partially fused with<br>median tooth .....                                                                                                                                   | <i>Cricotopus trifascia</i> group (p. 40)         |
| 1st and 2nd lateral teeth distinct, not fused with median tooth .....                                                                                                                                                                | 18                                                |
| 18. Median tooth of labial plate peaked; preanal papillae distinctly longer than<br>wide .....                                                                                                                                       | <i>Eukiefferiella discoloripes</i> group (p. 43)  |
| Median tooth of labial plate rounded or truncate; preanal papillae no longer<br>than wide .....                                                                                                                                      | 19                                                |
| 19. Mandible without spines on inner margin; body with only fine hairs; mature<br>larvae more than 8 mm in length .....                                                                                                              | <i>Cardiocladius obscurus</i> ? (p. 33)           |
| Mandible with 2-3 spines on inner margin; body with coarse hairs; mature<br>larvae less than 7 mm in length .....                                                                                                                    | <i>Eukiefferiella potthasti</i> group (p. 44)     |
| 20. Body distinctly hairy; mandible with serrations on inner margin .....                                                                                                                                                            | 21                                                |
| Body not distinctly hairy; inner margin of mandible smooth .....                                                                                                                                                                     | 23                                                |
| 21. Antenna with 5 segments; preanal papillae longer than wide; median teeth of<br>labial plate pointed .....                                                                                                                        | <i>Eukiefferiella bavarica</i> group (p. 41)      |
| Antenna with 4 segments; preanal papillae no longer than wide; median teeth<br>of labial plate rounded .....                                                                                                                         | 22                                                |
| 22. Median teeth of labial plate about as wide as 1st lateral<br>teeth .....                                                                                                                                                         | <i>Eukiefferiella claripennis</i> group (p. 42)   |
| Median teeth of labial plate nearly twice as wide as 1st lateral<br>teeth .....                                                                                                                                                      | <i>Eukiefferiella pseudomontana</i> group (p. 45) |
| 23. Antennal ratio about 1.5, 3rd segment about as long as 4th segment; premandible<br>bifid .....                                                                                                                                   | <i>Parametriocnemus</i> (p. 56)                   |
| Antennal ratio less than 1.5, 3rd segment much shorter than 4th segment;<br>premandible simple .....                                                                                                                                 | <i>Heterotrissocladius</i> (p. 46)                |
| 24. Pecten epipharyngis a conical plate (see p. 38); 1st and 2nd lateral teeth of labial plate<br>often partially fused .....                                                                                                        | 25                                                |
| Pecten epipharyngis composed of 3 equal-sized teeth (see p. 36); 1st and 2nd lateral<br>teeth distinctly separated. ....                                                                                                             | 26                                                |
| 25. Premandible with 2 apical teeth .....                                                                                                                                                                                            | <i>Cricotopus sylvestris</i> group (p. 38)        |
| Premandible with 1 apical tooth .....                                                                                                                                                                                                | <i>Cricotopus intersectus</i> group (p. 37)       |
| (There are 4 other groups of <i>Cricotopus</i> that will key out with <i>C. intersectus</i> group. If the<br>specimen does not fit the "species characters" on page 37, see Hirvenoja (1973) for deter-<br>mining the proper group.) |                                                   |
| 26. Inner margin of mandible with serrations .....                                                                                                                                                                                   | <i>Cricotopus bicinctus</i> (p. 36)               |
| Inner margin of mandible smooth .....                                                                                                                                                                                                | 27                                                |
| 27. Abdominal segments with hair pencils, although sometimes pale and difficult<br>to see .....                                                                                                                                      | 28                                                |
| Abdominal segments without hair pencils .....                                                                                                                                                                                        | 29                                                |
| 28. Median tooth of labial plate no more than 2½ times as wide as 1st lateral<br>teeth .....                                                                                                                                         | <i>Cricotopus tremulus</i> group (part, p. 39)    |
| Median tooth of labial plate more than 2½ times as wide as 1st<br>laterals .....                                                                                                                                                     | Other <i>Cricotopus</i> (see Hirvenoja, 1973)     |
| 29. Labial plate triangular, the anterior margin of the lateral teeth straight .....                                                                                                                                                 | 30                                                |
| Labial plate convex, the anterior margin of the lateral teeth curved .....                                                                                                                                                           | 31                                                |

30. Median tooth of labial plate partially fused with 1st lateral teeth; outer margin of mandible crenulate ..... *Orthocladius* prob. *annectens* (p. 53)  
Median tooth of labial plate distinctly separated from 1st laterals ..... Other *Orthocladius* or *Cricotopus* — see Sponis (1977) and Hirvenoja (1973)
31. Lauterborn organs robust, longer than 3rd antennal segment; mandible with smooth outer margin except for notch opposite 5th inner tooth; claws of anterior prolegs strongly pectinate . . . *Orthocladius* (*Euorthocladius*) Type III (p. 52)  
With another combination of characters ..... 32
32. Labial plate broadly and evenly rounded, middle tooth 2½-3 times as wide as 1st laterals; outer margin of mandible smooth to weakly crenulate ..... *Orthocladius* (*Orthocladius*) *obumbratus* (p. 54)  
With another combination of characters ..... Other *Orthocladius* or *Cricotopus* — see Sponis (1977) and Hirvenoja (1973)

## CHIRONOMINI

1. Paralabial plates widely separated ..... 3  
Paralabial plates close together, nearly touching ..... 2
2. Paralabial plates rounded at both ends, about 4 times as long as wide ..... *Pseudochironomus* (p. 84)  
Paralabial plates pointed on median apex, usually less than 4 times as long as wide ..... Not included (*Xenochironomus*, *Lauterborniella*, *Goeldichironomus*)
3. Antenna with 5 segments (may appear to have 4 segments) ..... 6  
Antenna with 6 segments ..... 4  
Antenna with 7 segments ..... Not included (*Demicryptochironomus*)
4. Median 2-4 teeth of labial plate light-colored ..... 5  
All teeth of labial plate uniformly dark ..... Not included (*Stictochironomus*)
5. Middle 2 teeth of labial plate light-colored and longer than 1st lateral teeth ..... *Microtendipes* (p. 73)  
Middle 4 teeth of labial plate light-colored and shorter than 2nd lateral teeth ..... *Paratendipes* (p. 77)
6. Labial plate with at least 1st lateral teeth obliquely arched toward median tooth, lateral teeth generally uniform in size ..... 7  
Lateral teeth of labial plate all directed anteriorly ..... 11
7. Median tooth or teeth light, dome-shaped, and usually shorter than lateral teeth ..... 9  
Median tooth or teeth pointed or cleft, at least twice as wide as 1st lateral teeth ..... *Parachironomus* 8
8. Median tooth of labial plate pointed ..... *Parachironomus abortivus* (p. 75)  
Median tooth of labial plate cleft ..... *Parachironomus frequens* (p. 76)
9. Labial plate with 13 teeth, median tooth small and recessed between 1st lateral teeth ..... *Nilothauma* (p. 74)  
Labial plate with 11 or 15 teeth, median tooth wider than combined width of 1st and 2nd lateral teeth ..... 10
10. Labial plate with 15 teeth, median tooth very wide, notched and only slightly convex ..... *Harnischia* (p. 72)  
Labial plate with 11 teeth, median tooth narrower than above and strongly convex ..... *Cryptochironomus* (p. 65)
11. Labial plate with an even number of teeth ..... 12  
Labial plate with an odd number of teeth ..... 20
12. 1st lateral teeth of labial plate longer than 2nd lateral teeth ..... 16  
1st lateral teeth of labial plate equal to or shorter than 2nd lateral teeth ..... *Polypedilum* 13

- (Couplets 13-15 are a partial key for *Polypedilum*, condensed and modified from Maschwitz, 1976)
13. 1st lateral teeth of labial plate shorter than median teeth and  
     2nd lateral teeth .....14  
     1st lateral teeth of labial plate about the same length as median  
     teeth and 2nd laterals .....*Polypedilum fallax* group (p. 81)
  14. Antenna apparently 4-segmented, segments 3-5 greatly  
     reduced .....*Polypedilum (Tripodura) nr. scalaenum* (p. 83)  
     Antenna distinctly 5-segmented, segments 3-5 not reduced .....15
  15. Paralabial plates with lateral tips extended and posterior lobes enlarged  
     and rounded .....*Polypedilum (Polypedilum) convictum* (p. 80)  
     Paralabial plates without extended lateral tips or enlarged posterior  
     lobes .....*Polypedilum (Polypedilum) illinoense* (p. 82)  
     (Several species of *Polypedilum* will key out here. Rearings are necessary for accurate  
     species identifications.)
  16. Paralabial plates 3-4 times as long as wide; teeth of labial plate usually  
     short and rounded, median teeth fused for much of  
     their length .....*Endochironomus* 17  
     Paralabial plates at most 3 times as long as wide; teeth of labial  
     plate usually pointed, median teeth only slightly fused .....18
  17. Paralabial plates about 4 times as long as wide; 2nd lateral teeth  
     of labial plate distinctly shorter than 1st and  
     3rd laterals .....*Endochironomus nigricans* (p. 69)  
     Paralabial plates about 3 times as long as wide; 2nd lateral teeth  
     of labial plate nearly as long as  
     3rd laterals .....*Endochironomus subtendens* (p. 70)
  18. Antennal blade longer than antennal segments 2-5; 3rd antennal  
     segment about as long as wide .....*Tribelos* (p. 85)  
     Antennal blade shorter than antennal segments 2-5; 3rd antennal  
     segment longer than wide .....*Phaenopsectra* 19
  19. Median teeth of labial plate shorter than 1st laterals; antennal  
     ratio about 1.0 .....*Phaenopsectra flavipes* (p. 79)  
     Median teeth of labial plate about as long as 1st laterals;  
     antennal ratio 1.3-1.4 .....*Phaenopsectra* prob. *dyari* (p. 78)
  20. Median tooth of labial plate trifid .....21  
     Median tooth of labial plate simple, although shallow notches  
     may be present .....27
  21. Body segment 11 with 2 pairs of ventral tubules .....*Chironomus* (part) 22  
     Body segment 11 with at most 1 pair of ventral  
     tubules .....Not included (*Einfeldia*, *Kiefferulus*, some *Chironomus*)
  22. Anterior margin of paralabial plates weakly but distinctly  
     undulate .....Not included (*Chironomus staegei* group, see Sublette, 1971)  
     Anterior margin of paralabial plates smooth .....23
  23. 10th body segment with a small postero-lateral projection on  
     each side .....24  
     10th body segment without a small postero-lateral process  
     on each side .....26
  24. Basal mandibular tooth  
     dark .....Not included (*Chironomus tentans*, *C. plumosus* group)  
     Basal mandibular tooth pale .....25
  25. Mature larva 12-16 mm in length .....*Chironomus decorus* group (p. 63)  
     Mature larva longer than 16 mm .....Not included (*Chironomus anthracinus* group)
  26. Mature larva 12-16 mm in length, ring organ near basal 1/3 of  
     1st antennal segment .....*Chironomus riparius* group (p. 64)  
     Mature larva 15-18 mm in length, ring organ near the middle of 1st  
     antennal segment .....Not included (*Chironomus anthracinus* group?)

27. Median tooth of labial plate wider than long, usually shorter than the  
1st lateral teeth; paralabial plates longer than  
width of labial plate ..... *Glyptotendipes* (p. 71)
- Median tooth of labial plate as long or longer than 1st lateral teeth;  
paralabial plates not as long as width of labial plate ..... *Dicrotendipes* 28
28. 1st and 2nd lateral teeth of labial plate partially fused; head capsule  
with a dark dorsal stripe ..... *Dicrotendipes neomodestus* (p. 66)
- 1st and 2nd lateral teeth of labial plate distinctly separated; head  
capsule without a dark dorsal stripe ..... 29
29. 5th and 6th lateral teeth of labial plate partially fused; 3rd inner tooth  
of mandible unequally compound ..... *Dicrotendipes nervosus* Type II (p. 68)
- 5th and 6th lateral teeth of labial plate not partially fused; 3rd inner  
tooth of mandible equally compound ..... *Dicrotendipes nervosus* Type I (p. 67)

## TANYTARSINI

1. Paralabial plates widely separated and pointed on inner margins ..... 2
- Paralabial plates nearly meet at midline, usually bluntly rounded  
on inner margins ..... 5
2. Lauterborn organs alternate, arising from different levels on 2nd  
antennal segment ..... 3
- Lauterborn organs opposite, both originating from the same level on  
2nd antennal segment ..... 4
3. 2nd antennal segment about as long as combined length of  
segments 3-5 ..... *Zavrelia* (p. 94)
- 2nd antennal segment longer than combined length of  
segments 3-5 ..... Not included (*Stempellinella*)
4. Basal tubercle of antenna with a large palmate process ..... Not included (*Stempellina*)
- Basal tubercle of antenna without a palmate process, but with  
a strong spine on the inner apex ..... Not included (*Constempellina*)
5. Labial plate with 3 teeth; mandible lacking distinct teeth ..... Not included (*Corynocera*)
- Labial plate with at least 9 teeth; mandible with distinct teeth ..... 6
6. Lauterborn organs sessile on tip of 2nd antennal segment ..... *Paratanytarsus* (p. 88)
- Lauterborn organs with at least a short petiole ..... 7
7. Petiole of Lauterborn organ equal to or longer than antennal segments 3-5 ..... 10
- Petiole of Lauterborn organ shorter than last 3 antennal segments ..... 8
8. Lauterborn organ relatively small, petiole equal to or longer than 3rd  
antennal segment; larval case with one or more  
outside ribs ..... *Rheotanytarsus* 9
- Lauterborn organ larger, petiole shorter than 3rd  
antennal segment ..... Not included (*Cladotanytarsus* = *Atanytarsus*)
9. Case attached at the end of a petiole; antennal ratio  
less than 2.0 ..... *Rheotanytarsus distinctissimus* group (p. 89)
- Case attached along one side; antennal ratio 2.0  
or greater ..... *Rheotanytarsus exiguus* group (p. 90)
10. Petiole of Lauterborn organ about as long as last 3 antennal segments;  
labial plate strongly arcuate and uniformly dark ..... *Tanytarsus coffmani* (p. 91)
- Petiole of Lauterborn organ at least twice as long as last  
3 antennal segments ..... 11

- \*\* 11. Antennal tubercle with well-developed spur on inner apex .....*Micropsectra* (p. 87)  
 Antennal tubercle usually without an apical spur, if present it  
 is pale and no longer than wide .....*Tanytarsus* 12
12. Antennal tubercle without a spur .....13  
 Antennal tubercle with a pale blunt or nipple-like spur on inner  
 apex; median and 1st lateral teeth of labial plate project  
 beyond the other teeth .....*Tanytarsus glabrescens* group (p. 92)
13. Median tooth of labial plate with pale center; paralabial plates  
 4½-6 times as long as wide; petiole of Lauterborn organ 3½ times as  
 long as antennal segments 3-5 .....*Tanytarsus guerlus* group (p. 93)  
 With another combination of characters .....Not included (Other *Tanytarsus*)

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\*\*The separation of *Tanytarsus* and *Micropsectra* in the larval stage presents problems. As noted in the key, we have found some *Tanytarsus* larvae with a small spur on the antennal tubercle, which has been used as a diagnostic character for *Micropsectra*. Coffman (personal communication) has found other larvae of *Tanytarsus* with spurs so long that they almost cross. According to Sublette (personal communication), larvae of *Micropsectra* are much larger and have more heavily sclerotized head capsules than those of *Tanytarsus*. New distinguishing characters are needed for these 2 genera.

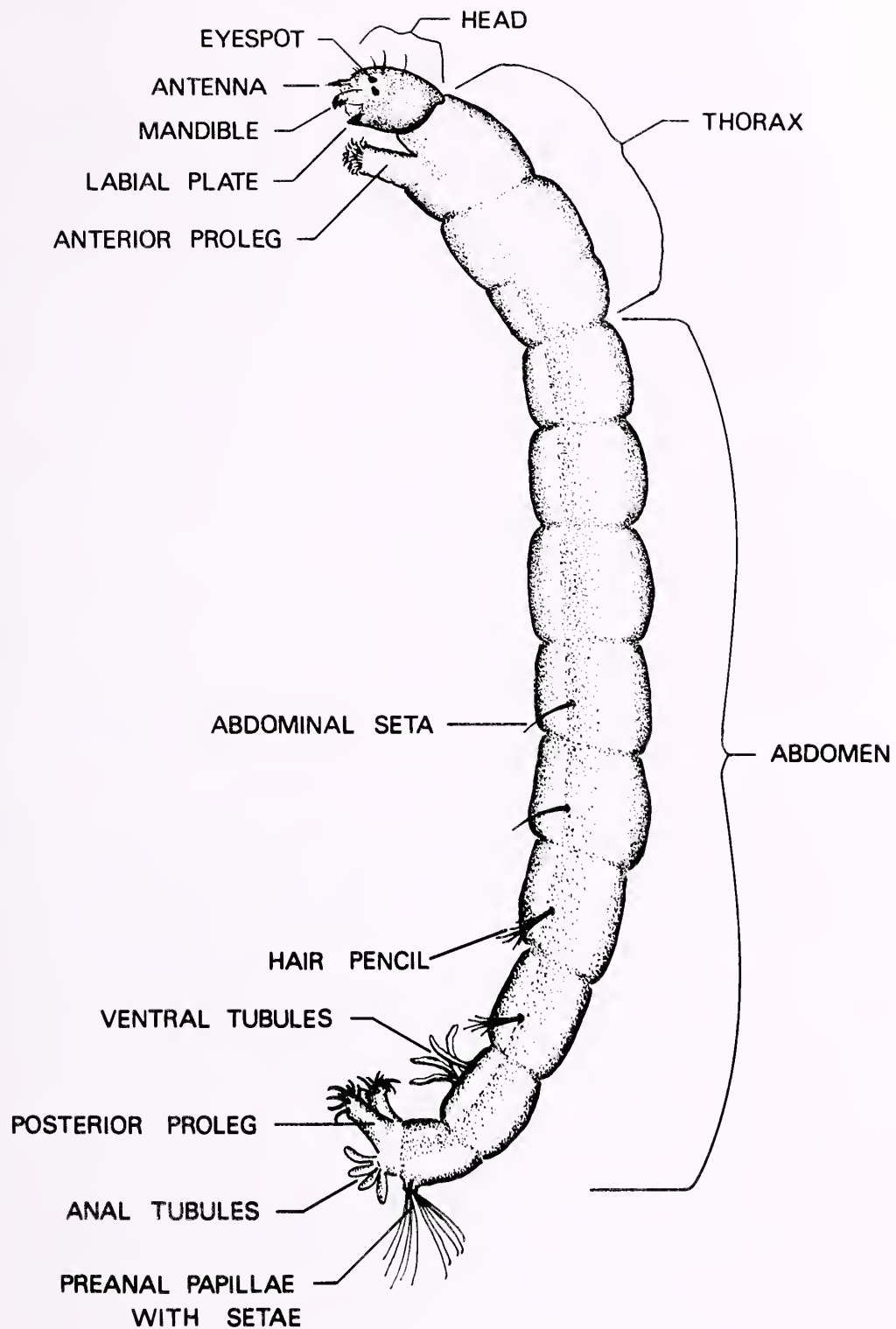
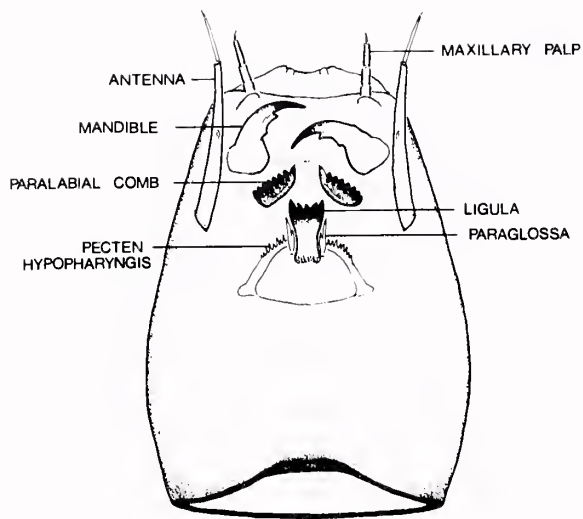
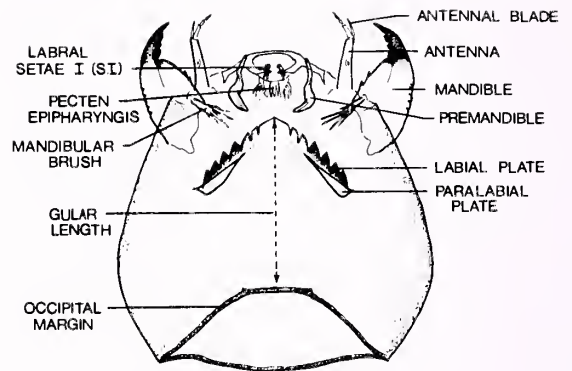


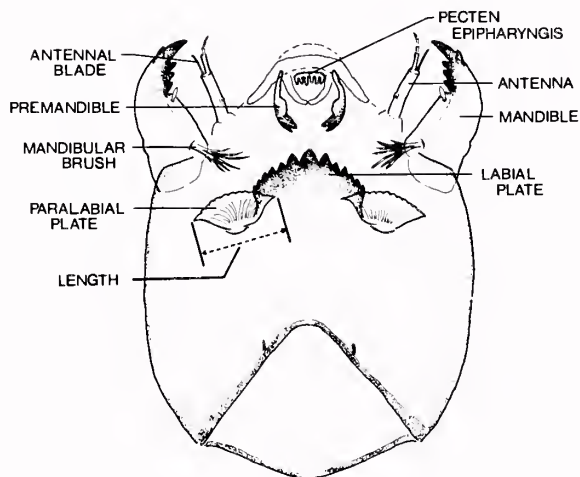
Figure 4. Schematic Drawing of a Chironomid Larva



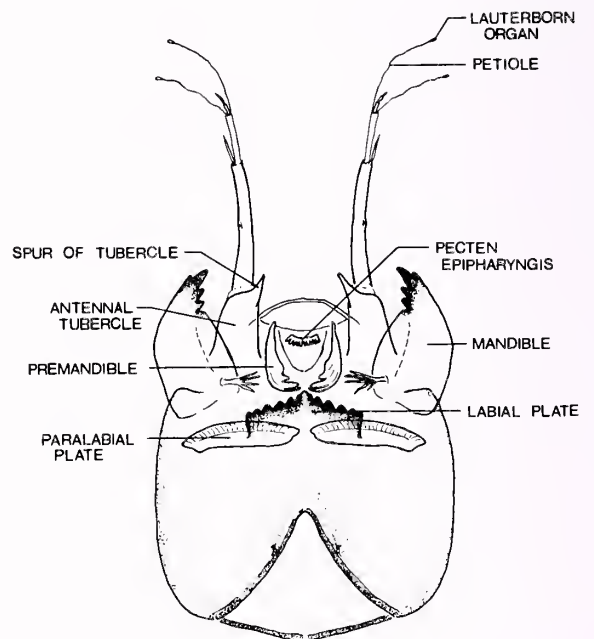
a. Subfamily Tanypodinae



b. Subfamily Orthoclaadiinae



c. Subfamily Chironominae  
Tribe Chironomini



d. Subfamily Chironominae  
Tribe Tanytarsini

**Figure 5. Larval Head Capsules of the Major Subdivisions of Freshwater Chironomidae (ventral views)**

## SUBFAMILY TANYPODINAE

### Distinguishing characteristics

The larvae of this subfamily have long, retractile antennae, a fork-shaped ligula, and do not have a well-defined labial plate (Fig. 5a). The mandibles are generally scythe-shaped and usually lack prominent teeth.

### Taxonomy

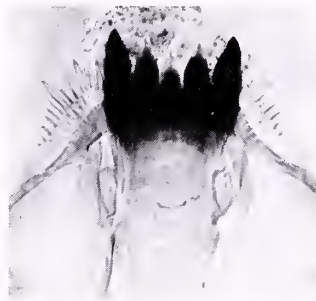
Dr. Roback has begun his work on the eastern immature Chironomidae with this subfamily and has published a key to tribes and descriptions of a few genera (Roback 1976, 1977, 1978). Adults can be identified using one of his earlier papers (Roback, 1971). The largest and perhaps most difficult genus (with regard to larval taxonomy) is *Procladius*. The larvae are extremely difficult to distinguish and associated pupae and adults may always be necessary for making species identifications. Another difficult group is the Tribe Pentaneurini, which contains several genera that cannot be determined without associated material. For example, generic characters are still not known for the *Thienemannimyia* group, a collection of five genera (*Thienemannimyia*, *Conchapelopia*, *Telopelopia*, *Xenopelopia* and *Arctopelopia*) formerly included in the genus *Pentaneura* (Roback, 1957, 1971).

All genera in this section, except for *Pentaneura*, will key in Oliver et al. (1978).

### Biology

The larvae are generally carnivorous, although only a few species are obligate carnivores (Oliver, 1971). Their food often consists of other chironomid larvae, small crustaceans, oligochaete worms, and diatoms (Roback, 1969), but may also include algae and detritus (Oliver, 1971).

Members of this subfamily are a common component of the multiplate fauna in all types of waters. Although individual species may be sensitive to organic wastes, the subfamily as a whole apparently is unaffected. They are found in similar densities above and below organic discharges, although their relative abundance may decrease due to the proliferation of saprophilic species. Some Tanypodinae (notably some members of the *Thienemannimyia* group) are particularly tolerant of toxins, and are the dominant life form under some toxic conditions.



ligula



maxillary palp



posterior prolegs,  
with 3 dark claws

### Generic Characters

Maxillary palps with 2 or more basal segments\*; ligula with 5 teeth, anterior margin concave; mandibles with a truncate lateral tooth; posterior prolegs with 1-4 dark brown claws.

\* This character is especially useful for recognizing the genus.

### Specific Characters

Maxillary palps with 5 basal segments; posterior prolegs with 2-3 dark claws; antennal ratio about 4.5.

### Taxonomic Status

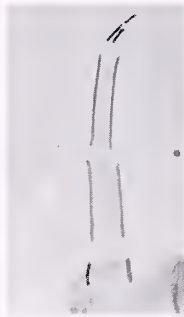
Fair. Genus and species can be determined for larvae using Beck (1976). Associated adults can be verified with Roback (1971). Oliver et al. (1978) found another species of *Ablabesmyia* with a 5-segmented maxillary palp (*Ablabesmyia* sp. 2).

### Distribution and Ecology

This species appeared in half of the river systems sampled, but was usually found in numbers less than 10 individuals. We have collected it over a wide range of physical and chemical conditions, from clean, swift-flowing streams to organically enriched, sluggish rivers, and in some cases, where toxic chemicals were present. Thus it is truly facultative, a conclusion also reached by Mason, Lewis, and Anderson (1971). Beck (1977) listed collections in both lentic and lotic habitats. This species is apparently widespread across North America (Sublette and Sublette, 1965).

### References

This species keys to the *Pentaneura monilis* group in Johannsen (1937a) and Roback (1957). Roback (1959) revised *Ablabesmyia* as a subgenus of *Pentaneura*, with an adult key to 13 species. Beck (1976) provided a larval key for 12 species of *Ablabesmyia* (pp. 33-34). Beck and Beck (1966) described the larva, pupa and adults of this species (pp. 325-326).



maxillary palp

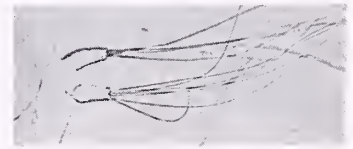


ligula



posterior proleg with  
2 dark claws

preanal papillae



### Generic Characters

Maxillary palp with 2 or more basal segments\*; ligula with 5 teeth, anterior margin concave; mandibles with a truncate lateral tooth; posterior prolegs with 1-4 dark brown claws.

\* This character is especially useful for recognizing the genus.

### Specific Characters

Maxillary palp with 3 basal segments, the 1st segment very short; ligula with 5 teeth, the median tooth shortest and the 1st and 2nd laterals equal in length; posterior proleg with 2 dark claws, one shorter and darker than the other; antennal ratio 4.5; preanal papillae 2.5 times as long as wide.

### Taxonomic Status

Fair. Larvae of 12 of the 18 North American species can be keyed in Beck (1976). Associated adults may be keyed in Roback (1971). This species will key to *Pentaneura monilis* group in both Johannsen (1937a) and Roback (1957). Our determinations were made using larvae; reared specimens were not available for verification.

### Distribution and Ecology

This species is less common than *Ablabesmyia mallochi* on multiplate samplers. The two species are often collected together and probably have similar environmental requirements. This species appears to be facultative, occurring over a wide range of water quality conditions. It was most common in the canalized section of a moderately clean river. Beck (1977) also listed broad environmental requirements for this species. In mounted specimens, the head capsules of other chironomid larvae are often visible in the gut, attesting to this species' predaceous habits.

### References

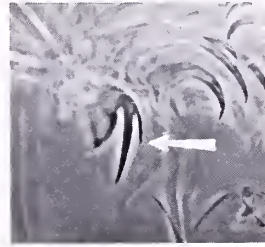
Roback (1959) revised *Ablabesmyia* as a subgenus of *Pentaneura*, and included an adult key for 13 species. Beck (1976) gave a larval key for 12 species. Beck and Beck (1966) described and keyed the larva, pupa and adults of this species as *A. janta*.



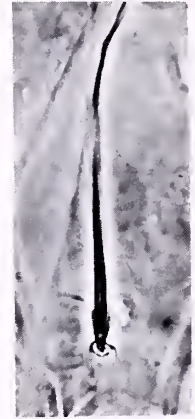
mandible



ligula



bifid claw of  
posterior proleg



spur of posterior  
proleg

### Generic Characters

Ligula with 5 teeth, the median tooth longer than the 1st laterals; each posterior proleg with a long spur and 1 bifid claw; 2nd antennal segment darker than 1st segment; mandible with 1 or more large inner teeth.

The bifid claw on the posterior proleg will distinguish this from *Nilotanypus*.

### Specific Characters

Head capsule granulate (with numerous, densely set, small bumps), posterior  $\frac{1}{4}$  darkly pigmented; spur of posterior proleg with 1-3 fine spines basally; antennal ratio 2.1-2.5.

### Taxonomic Status

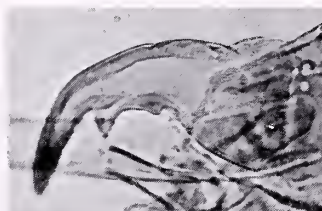
Fair. Of the 6 Nearctic species (Coffman, 1978) 5 species can be keyed in Beck (1976). Adults can be keyed in Roback (1971). The larva keys to *Pentaneura pilosella* in Johannsen (1937a), to *Pentaneura* nr. *pilosella* in Roback (1957) and to *Labrundinia* sp. 1 in Oliver et al. (1978). *Labrundinia floridana* (Beck and Beck) was tentatively synonymized with *L. pilosella* by Roback (1971).

### Distribution and Ecology

*Labrundinia* is occasionally found on multiplate samplers, though usually in small numbers. Our distributional records show that it is found mostly in cleaner waters of small streams to medium-sized rivers, though it was also present below a mild sewage effluent. Beck (1977) listed *Labrundinia floridana* with possible eutrophic tendencies, and recorded it from lakes, ponds, rivers and streams. Coffman (1978) listed *Labrundinia* as a predator of Oligochaeta, Cladocera, and Ostracoda; we have specimens with head capsules of early instar Chironomidae in the gut, indicating that it feeds on these.

### References

Beck (1976) gave a larval key to 5 species of *Labrundinia* (p. 32). Roback (1971, pp. 276-277) discussed the possible synonymy of *L. floridana* and *L. pilosella*. Beck and Beck (1966) described and keyed all stages of this species under 2 names, *Labrundinia floridana* and *L. pilosella*.



mandible



ligula



preanal papilla

### Generic Characters

Antennal ratio less than 3.5, head capsule length/width ratio about 1.2, its length at least 2.5 times as long as antenna; ligula with 5 teeth, anterior margin slightly to deeply concave; mandible with a large inner tooth; preanal papillae 5.6-7.4 times as long as wide; body color red.

### Specific Characters

Anterior margin of ligula only slightly concave, sometimes appearing nearly straight, mandible with a prominent inner tooth which is partially truncate; antennal ratio 1.93-2.08 (Roback, 1978), although some of our specimens exhibit antennal ratios of up to 2.4.

### Taxonomic Status

Fair. Larval and pupal keys are available (Roback, 1978). Although 4 larval and pupal types of *Natarsia* have been defined by Roback (1978), it is uncertain if they represent species or varieties of *N. baltimoreus*. This larva will key to *N. baltimoreus* in Oliver et al. (1978) and to *Anatopynia fastuosa* in Roback (1957).

### Distribution and Ecology

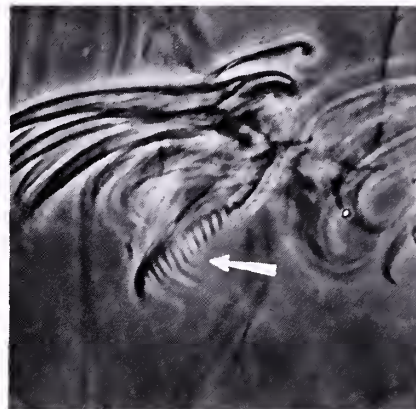
All 5 collection sites for this species were severely damaged biologically by toxic wastes. From our records, it appears to be a tolerant indicator organism. Roback (1978) gives some water quality data for his collection sites for *Natarsia*, but did not observe this tolerant tendency. This species feeds on diatoms, Cladocera, ostracods, copepods, and chironomids (Roback, 1969).

### References

Johannsen's (1937a) and Roback's (1957) descriptions of *Anatopynia (Macropelopia) fastuosa* included this species. Roback (1978) gave complete larval and pupal descriptions for 4 possible species of *Natarsia*. Roback (1971) gave keys and descriptions for adults of 2 species, *N. baltimoreus* and *N. miripes*.



ligula



pectinate claw of  
posterior proleg

### Generic Characters

Head capsule long and narrow; ligula with 5 teeth, anterior margin convex; posterior prolegs without any bifid claws\*; mandible with 2 inner teeth; 2nd antennal segment same color as 1st segment.

\* This character distinguishes this genus from *Labrundinia*.

### Specific Characters

Teeth of ligula nearly uniform in width; head capsule length/width ratio 1.75-2.00, antennal ratio about 3.0; posterior prolegs with 1 comb-like claw, with 10-15 fine teeth on the inner margin (this may be a generic character).

### Taxonomic Status

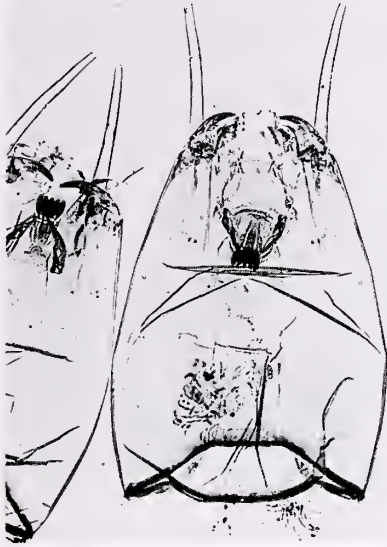
Fair. At present, there are only 2 species listed for North America, *N. americanus* and *N. fimbriatus*. Roback (1971, p. 282) noted that *N. fimbriatus* may be the only North American species, since the adult males of *N. americanus* are not known. Our larvae fit the description for *N. americanus* given by Beck and Beck (1966). Without adult males (which can be keyed in Roback, 1971), we cannot be certain of the species.

### Distribution and Ecology

*Nilotanypus* was found on multiplates in half the river systems sampled, being consistently absent from larger, slow-moving rivers. Like *Labrundinia*, this genus may be found below mild waste loadings, but generally occurs in relatively clean water. It was often collected where *Rheotanytarsus* was abundant, and showed a preference for swifter currents. Rosenberg and Wiens (1976) found that *Nilotanypus fimbriatus* showed a strong negative response to crude oil pollution, and predicted a high usefulness as a sensitive indicator species.

### References

The larva keys to *Pentaneura pilosella* in Johannsen (1937a), and only to *Pentaneura* in Roback (1957). Beck and Beck (1966) described the larva, pupa, and adult female of *N. americanus*.



ligula



supra-anal bristle  
preanal papilla  
posterior proleg

### Generic Characters

Ligula with 5 teeth of approximate equal width, anterior margin straight; antennal ratio about 4.0; preanal papillae more than 6 times as long as wide; supra-anal bristles arise from distinct papillae; claws of posterior proleg simple, one claw darkly pigmented (others pale); mandible with 2 prominent inner teeth.

### Specific Characters

This larva cannot be distinguished from *P. inconspicua* as described by Beck and Beck (1966): antennal ratio 3.7-4.2; basal segment of maxillary palp 4 times as long as wide; 1 broad seta arising near base of proleg about  $\frac{1}{2}$  as long as proleg; anal tubules very slender, at least twice as long as posterior prolegs.

### Taxonomic Status

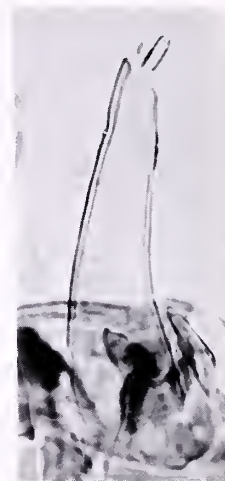
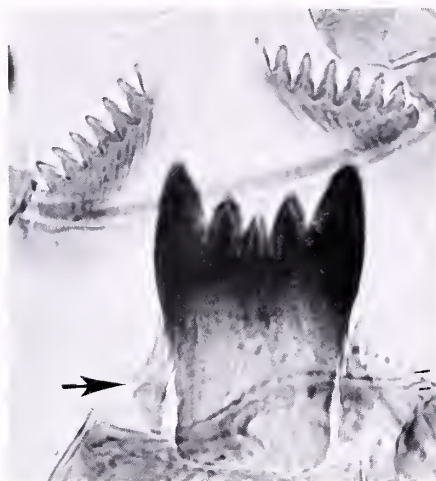
Fair. There are only 2 species in this genus, *P. inconspicua* and *P. inyoensis*. All other species of this once large genus have been placed elsewhere (Roback, 1971). The larvae will key to genus in Beck (1976) and the adults of both species will key in Roback (1971). Without adult material, species determination is not possible.

### Distribution and Ecology

This species was found sporadically in medium to large-sized rivers and only where the overall water quality was good to excellent. It was found in greatest abundance in communities with various Tanytarsini and the caddisfly *Cheumatopsyche* (Trichoptera: Hydropsychidae). In mounted specimens, the head capsules of other chironomid larvae are often visible in the gut, attesting to this taxon's predaceous habits.

### References

Beck and Beck (1966) described all stages of *Pentaneura inconspicua* (as *P. inculta*). Coffman (1978) listed 8 ecological references for *Pentaneura*. Roback's (1957) description of *Pentaneura (carnea gr.)* sp. 3 closely matches our species.



ligula

antenna

paraglossa

### Generic Characters

Paralabial combs well developed and conspicuous; ligula with 5 black teeth; abdomen with lateral hair fringe; head length/width ratio 1.2-1.3; antennae  $\frac{1}{4}$  as long as head.

### Specific Characters

1st antennal segment very long (antennal ratio about 7.0); median tooth of ligula about  $\frac{1}{2}$  as large as 1st laterals; paraglossae with long tip, 2-3 inner teeth and 3-4 outer teeth; paralabial combs with 8 teeth.

### Taxonomic Status

Fair. We have numerous rearings of *Procladius* from multiplate samplers, and they are all *P. sublettei*. However, there are over 30 species in North America (Coffman, 1978) and the larvae are extremely difficult to differentiate (Roback, personal communication). There may be other species with the "specific characters" listed above.

### Distribution and Ecology

This species occurred sporadically on multiplate samplers and over a wide range of environmental conditions. It was found in the most pristine headwaters as well as in some heavily polluted lowland rivers. Generally, it was absent from habitats with rapid currents, and is possibly embenthic, burrowing in the sediments that accumulate on multiplates in slower currents. Because of its apparent indifference to water quality, it appears to have little value as an indicator species.

### References

Roback (1957) listed 6 species, and gave larval and pupal keys. This taxon keys to *P. culiciformis* (= *P. sublettei*, in part) in his larval key. Adults of *Procladius* may be keyed in Roback (1971). Coffman (1978) gave 20 ecological references for the genus.



mandible with minute  
inner tooth

maxillary palp

### Generic Characters

Ligula with 5 teeth, anterior margin concave, and 1st laterals turned outward; mandibles with very small inner tooth; antenna at least half the length of the head; head more than 1.8 times as long as wide; abdomen with scattered hairs; maxillary palp with one basal segment.

### Specific Characters

It is not possible to separate the larvae of this group into genera. We have reared 4 species, *Thienemannimyia norena*, *T. senata*, *Conchapelopia dusena* and *C. goniodes*. In addition to *Thienemannimyia* and *Conchapelopia*, *Telopelopia*, *Arctopelopia* and *Xenopelopia* are also included in this group (Roback, 1971).

### Taxonomic Status

Poor. The group may be keyed in Oliver et al. (1978), but the genera are indistinguishable in the larval stages. Adults can be keyed in Roback (1971). Members of this group key to *Pentaneura* in Johannsen (1937a) and Roback (1957). The pupae are much easier to distinguish than the larvae (Roback, personal communication).

### Distribution and Ecology

This group is one of our most commonly encountered, being found in all the river systems sampled, and at 80% of the sampling sites. It often becomes prevalent in areas subjected to toxic stresses, along with *Cricotopus bicinctus* and *C. sylvestris* gr. Its abundance is apparently unaffected by organic wastes. Roback (1974) listed *Conchapelopia* spp. as occurring under conditions of high pH (>8.5), high sulfate (>400 ppm) and high BOD (>5.9 ppm).

### References

Fittkau (1957) set adult generic limits for *Thienemannimyia* and *Conchapelopia*. Beck and Beck (1966) discussed the genera in this group, and described species of *Conchapelopia* and *Arctopelopia*.

## SUBFAMILY DIAMESINAE

### Distinguishing characteristics

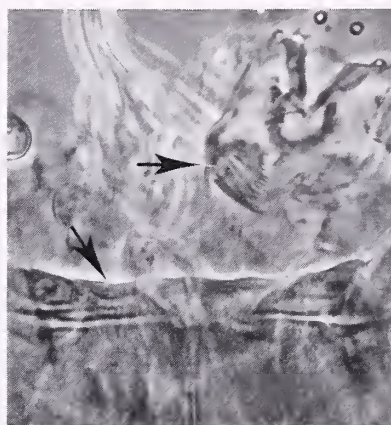
Most larvae can be distinguished by the antennae, which have the 3rd segment annulated (with several apparent rings), though this may be difficult to see. Paralabial plates may be lacking, or if present, without striations. In general, larvae are similar to the Orthoclaadiinae, but are usually larger.

### Taxonomy

This is a small subfamily, with only 12 genera, and most of these contain only a few species. By far the largest genus is *Diamesa*, with 30 species (Coffman, 1978). The subfamily still needs much taxonomic work, as it is difficult to key larvae even to the proper genus. The best references to date for this group are Pagast (1947), Roback (1957), Oliver (1959) and Tilley (1978).

### Biology

Most species are found in cold, fast streams, although exceptions occur in *Prodiamesa*, *Pseudodiamesa* and *Protanypus*, which may be found in ponds or oligotrophic lakes (Coffman, 1978). Generally members of this subfamily are clingers or burrowers, and collectors-gatherers or scrapers (Coffman, 1978).



premandible

labial plate



annulate  
3rd segment

antenna

### Generic Characters

Labial plate pale and toothless; premandibles with numerous teeth; mandibles with only 1 recurved tooth on inner surface; antennae with annulated 3rd segment.

### Specific Characters

Labial plate undulating, convex near its middle; premandibles fan-shaped, with numerous teeth; head capsule light except for dark occipital margin.

### Taxonomic Status

Poor. Although this is a small genus, there are no keys for any stages of Nearctic species.

### Distribution and Ecology

This species only occasionally occurs on multiplates, and was only found at 4 sites in our surveys. It is more commonly collected in net and bottom samples. It exhibits strong preferences for swift-flowing clean waters. Beck (1977) listed the genus as being rheobiontic and saprophobic.

### References

Pagast (1947) studied the *Diamesa* group genera. Mason (1973) and Oliver et al. (1978) included photographs of *Potthastia longimanus*.



labial plate

### Generic Characters

Labial plate with a broad, light, median tooth and 8-9 pairs of dark lateral teeth; antenna with 3rd segment annulate; premandible with 1-3 teeth; mandible with 4 inner teeth.

### Specific Characters

Although species cannot be determined, our specimens have simple premandibles and an antennal ratio of 1.2.

### Taxonomic Status

Poor. Even the generic status is uncertain; our determinations were made with reared specimens. In most keys this will key to either *Diamesa* or *Potthastia* as larvae, although it does key to *Sympotthastia* in Hilsenhoff (1975). Coffman (1978) listed this genus as containing 5 or less species.

### Distribution and Ecology

This species is found occasionally on multiplates in swift-flowing clean waters. Our records indicate that it occurs only in pristine habitats. This observation agrees with Beck (1977), who found it to be rheobiotic and saprophobic.

### References

Pagast (1947) studied the *Diamesa* group genera.

## SUBFAMILY ORTHOCLADIINAE

### Distinguishing characteristics

The larvae have a well defined labial plate but never possess striated paralabial plates as do the Chironominae (Fig. 5b). Paralabial plates are present in some species and they may be wrinkled (as in *Nanocladius*) or bear setae (as in *Rheocricotopus*), but are never striated. This subfamily is distinguished from the Diamesinae by the lack of annulations on the 3rd antennal segment.

### Taxonomy

There are approximately 50 genera of Orthoclaadiinae occurring in North America (Hamilton et al., 1969; Coffman, 1978), less than half of which can be identified in the larval stage using existing keys for the Nearctic fauna. Many of the subgenera and groups in Johannsen (1937a) and Roback (1957) are now considered to be genera. The best main references for the European fauna are Brundin (1956—adults) and Thienemann (1944—larvae and pupae).

### Biology

The Orthoclaadiinae is the most diverse of the chironomid subfamilies (Coffman, 1978), and its members are a common component of multiplate communities in all types of waters. Many species are microphagous, feeding on small plants and animals as well as on detritus (Oliver, 1971). Other species are leaf miners, predators, and parasites.

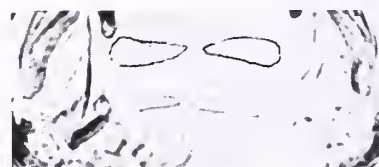
Some species (i.e. *Cricotopus bicinctus*, *Cricotopus sylvestris* group, *Nanocladius distinctus*) are insensitive to many types of wastes and become the most abundant organism in some stressed situations.



mandible, antenna



preanal papillae



labral plates

### Generic Characters

Antenna no more than half as long as head, the basal segment slightly but distinctly curved; labial plate uniformly dark and with 10-13 teeth; preanal papillae about twice as long as broad.

### Specific Characters

Labial plate with 13 teeth, middle tooth recessed; 2nd antennal segment no more than  $\frac{1}{2}$  as long as 3rd segment; 2nd pair of labral plates almost touching on midline; premandibles with 2 or 3 apical teeth; mandibles with 4 inner teeth, basal tooth truncate.

### Taxonomic Status

Fair. Of the 6 species listed in Sublette and Sublette (1965) the larvae of 3 may be keyed in Roback (1957, p. 63). Adult males of 6 Nearctic species may be keyed in Sublette (1967b).

### Distribution and Ecology

This species was found in 12 of the 17 rivers sampled, and exhibited a wide range of environmental tolerances. It was present in some clear, clean headwater reaches, as well as in some areas subjected to severe stress from toxic wastes. Beck (1977) listed *B. flavifrons* as limnobiontic, but our records indicate that it is indifferent to current speed. Coffman (1978) listed the larvae of the genus as shredders and detritivores.

### References

Roback (1957) described the larva and pupa and gave distributional data for *B. flavifrons?*, and included this species in his larval and pupal keys.



labial plate

### Generic Characters

Head capsule very dark and heavily sclerotized; labial plate with 11 teeth, middle tooth broadly truncated; labrum with simple spines but without pectinate plates; hypopharynx with distally projecting hairs; mature larva 8-10 mm in length.

### Specific Characters

None. Only one Nearctic species has been described in the larval stage.

### Taxonomic Status

Poor. Although three species are listed in Sublette and Sublette (1965) and an additional species was described by Saether (1969), only the larva of *C. obscurus* has been described from the Nearctic region. Sublette (1967b pp. 487-488) gave a diagnostic table for distinguishing the adult males of three species. The larva will key to genus in Roback (1957), Mason (1973), and Beck (1976).

### Distribution and Ecology

These larvae are commonly found on multiplate samplers, usually in areas subjected to strong currents. Coffman (1978) listed *Cardiocladius* as an engulfer, preying on blackfly larvae (Diptera:Simuliidae). We found a close association between these larvae and blackfly larvae, thus the occurrence of blackflies may play an important role in determining the distribution of *Cardiocladius*. Mason (1974) ranked *C. nr. obscurus* as relatively pollution sensitive. Beck (1977) listed *C. obscurus* as mesotrophic, saproxenous, and as occurring only in rivers and streams.

### References

Original descriptions for the larva and pupa of this species are in Johannsen (1937a). Thienemann (1932, 1944) reviewed the biology for the European species and presented larval and pupal keys for 4 European species, respectively.



labial plate



spur of  
posterior proleg

### Generic Characters

(Roback, 1957) Small species (body length 5 mm or less); antenna with 4 segments, at least  $1\frac{1}{2}$  times as long as head, segments 2 and 3 dark.

### Specific Characters

(Roback, 1957) 1st antennal segment shorter than head; its sensory pit located near base of 1st antennal segment; spur of posterior proleg with hairs along its shaft.

### Taxonomic Status

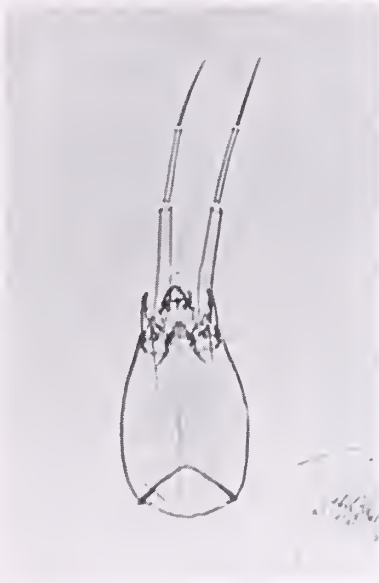
Fair. Of the 4 Nearctic species listed in Sublette and Sublette (1965), the larvae and pupae of 3 may be keyed in Roback (1957). However, recent evidence suggests that there are additional Nearctic species (Oliver et al., 1978).

### Distribution and Ecology

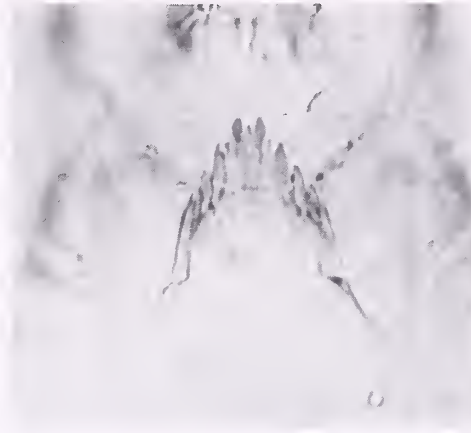
We encountered *C. celeripes* less often than *C. taris* (next page), but often at the same locations in mixed communities. Therefore, the notes on *C. taris* also apply to this species. They both appear to be clean water forms.

### References

See "*Corynoneura taris*" (next page).



labial plate



spur of  
posterior proleg

### Generic Characters

(Roback, 1957) Small species (body length 5 mm or less); antenna with 4 segments, at least  $1\frac{1}{3}$  times as long as head, segments 2 and 3 dark.

### Specific Characters

(Roback, 1957) 1st antennal segment shorter than head, its sensory pit closer to the middle of the segment than the base; spur of posterior proleg without hairs along its shaft, but with fine bristles at its base; labial plate with 13 teeth, middle tooth shorter than 1st lateral teeth; mandible with 1 apical and 4 lateral teeth.

### Taxonomic Status

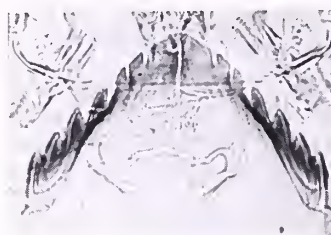
Fair. Of the 4 Nearctic species listed in Sublette and Sublette (1965), the larvae and pupae of 3 can be keyed in Roback (1957). However, recent evidence suggests that there are additional Nearctic species (Oliver, et al., 1978).

### Distribution and Ecology

We often found this species in small numbers in relatively clean streams and rivers. Beck (1977) listed it as rheobiontic and saprophobic and Mason et al. (1971) provisionally classified *Corynoneura* as pollution sensitive. Roback (1974) gave specific chemical values for water in which he found *C. taris*. It appears to be a clean water species. Coffman (1978) gave 5 ecological references for *Corynoneura*.

### References

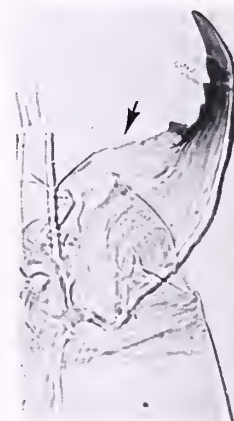
Roback (1957) gave a larval key for 3 Nearctic species of *Corynoneura*, and a pupal key for 2 species, plus the original description of this species. Schlee (1968) discussed the morphology and phylogeny of the *Corynoneura* group and Thienemann (1944) gave larval and pupal keys for 7 and 14 species, respectively. Sublette (1967a) presented a table comparing diagnostic characters for adults of 4 Nearctic species.



labial plate



3-toothed pecten  
epipharyngis



mandible showing  
serrations

### Generic Characters

Labial plate with odd number of teeth (usually 13), middle 5 teeth often lighter than outside laterals; labral seta I bifid, some species with hair pencils on abdomen which will distinguish them from *Orthocladius*; other species lack hair pencils and many cannot be distinguished from *Orthocladius*—exceptions include the *bicinctus*-group (serrated inner margin of mandible) and the *trifascia*-group (unique labial plate, p. 40).

### Specific Characters

*bicinctus*-group: labial plate with 13 teeth, middle 5 teeth lighter than outside lateral teeth, middle tooth at least 3 times as wide as 1st laterals; inner margin of mandible serrated; 1st antennal segment 4-5 times as long as wide. *bicinctus*: mandible of mature larva more than 143  $\mu$  in length (Oliver et al., 1978).

### Taxonomic Status

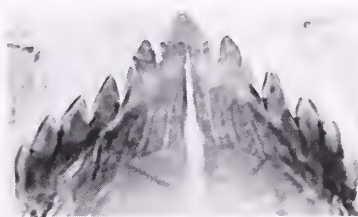
Fair. *Cricotopus bicinctus* is included in the larval keys of Johannsen (1937a), Roback (1957) and Beck (1976). Recent evidence (Oliver, 1977) indicates that *C. bicinctus* is a species complex. 2 known Nearctic species may be keyed in Oliver et al. (1978).

### Distribution and Ecology

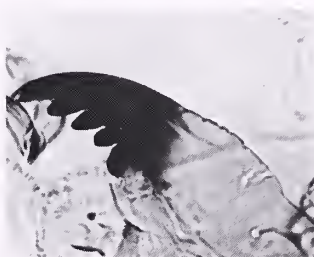
This is one of the most common chironomid larvae found on multiplate samplers, being absent from only 5 of our 225 sampling sites. It is a very adaptable and opportunistic species, being present in diverse, well-balanced communities, and increasing in abundance when various stresses eliminate more sensitive species. It appears to be particularly immune to toxic wastes. It has been shown to tolerate contamination by electroplating wastes (Surber, 1959) and crude oil (Rosenberg and Wiens, 1976). Beck (1977) listed *C. bicinctus* as having wide tolerances for pH, nutrients, and habitat types, and Roback (1974) included it on his extreme tolerance lists for high pH (>8.5) and high chlorides (>1000 ppm). Mason et al. (1971) provisionally classified *C. bicinctus* group as pollution tolerant.

### References

Hirvenoja (1973) revised the European species of *Cricotopus*, including 3 species in the *bicinctus*-group. Oliver (1977) documented the occurrence of 3 Nearctic species, and described the larva of a new species (*C. mackenziensis*) that is very similar to *C. bicinctus*.



labial plate



simple premandible

### Generic Characters

Labial plate with odd number of teeth (usually 13), middle 5 teeth often lighter than outside laterals; labral seta I bifid; some species with hair pencils on abdomen which will distinguish them from *Orthocladus*; other species lack hair pencils and many cannot be distinguished from *Orthocladus*—exceptions include the *bicinctus*-group (serrated inner margin of mandible) and the *trifascia*-group (unique labial plate, p. 40).

### Specific Characters

Labial plate with 13 teeth, 1st and 2nd laterals fused for much of their length; hair pencils present on some abdominal segments, about as long as the segments which bear them; premandibles simple; antennae about half as long as mandibles; pecten epipharyngis a conical plate.

There is only 1 European species in this group (Hirvenoja, 1973) and our specimens are considerably different.

### Taxonomic Status

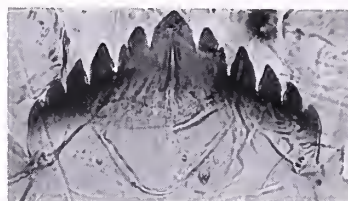
Poor. This resembles the *sylvestris*-group, but the premandible is simple. It will key to *laricomalis*-group in Oliver et al. (1978), but does not have the long hair pencils (about twice as long as the abdominal segments) characteristic of that group (Hirvenoja, 1973). All stages of the group may be keyed in Hirvenoja (1973).

### Distribution and Ecology

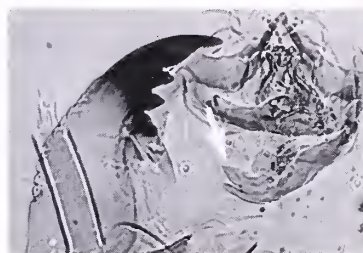
This group was found in medium to large-sized rivers and canals, including some sluggish areas subjected to severe organic and toxic waste loadings. In Europe, *C. intersectus* is characteristic of eutrophic lakes, and the larvae can exist in an extremely wide range of dissolved oxygen concentrations (Hirvenoja, 1973).

### References

All stages of *C. intersectus* group may be keyed in Hirvenoja (1973).



labial plate



bifid premandible



conical pecten  
epipharyngis

### Generic Characters

Labial plate with odd number of teeth (usually 13), middle 5 teeth often lighter than outside laterals; labral seta I bifid, some species with hair pencils on abdomen which will distinguish them from *Orthocladus*; other species lack hair pencils and many cannot be distinguished from *Orthocladus*—exceptions include the *bicinctus*-group (serrated inner margin of mandible) and the *trifascia*-group (unique labial plate, p. 40).

### Specific Characters

Labial plate with 13 teeth, 1st and 2nd laterals fused for much of their length, middle 5 teeth lighter than outside laterals; hair pencils present on some abdominal segments; premandible bifid; pecten epipharyngis a conical plate.

We have reared 2 species in this group, *C. sylvestris* and *C. trifasciatus* "kleinere form".

### Taxonomic Status

Poor. Six of the 12 European species are included in Hirvenoja's larval key (1973, p. 259). Nearctic species include *C. remus*, *C. sylvestris*, *C. tricinctus*, and *C. trifasciatus*. All stages may be keyed in Hirvenoja (1973). This will accurately key to group in Oliver et al. (1978), and will key to *C. sylvestris*, *C. trifasciatus*, *C. tricinctus* in Roback (1957).

### Distribution and Ecology

Within New York State, this group was found in slowly flowing, highly turbid waters, and also in large rivers with moderate to swift flow. It occurred over a wide range of water quality conditions and physical habitat types, including areas subjected to organic and toxic waste loadings. Its distribution appears to be determined more by factors such as food and competition from other species than by water quality. According to Hirvenoja (1973, pp. 277-284), *C. sylvestris* inhabits standing and slowly flowing waters that are rich in vegetation and plant remains. The larvae live on plants, stones and also in benthic mud and are found in areas with low levels of dissolved oxygen. Beck (1977) classified *C. sylvestris* as limnobiontic, oligoxyphilous, saproxenous, and eutrophic. Roback (1974) gave some chemical data for habitats of *C. sylvestris* gr.

### References

Hirvenoja (1973) presented taxonomic and ecological information for the European species in the group, including keys for all stages.



labial plate

### Generic Characters

Labial plate with odd number of teeth (usually 13), middle 5 teeth often lighter than outside laterals; labral seta I bifid; some species with hair pencils on abdomen which will distinguish them from *Orthocladius*; other species lack hair pencils and many cannot be distinguished from *Orthocladius*—exceptions include the *bicinctus*-group (serrated inner margin of mandible) and the *trifascia*-group (unique labial plate, p. 40).

### Specific Characters

Labial plate with 13 teeth, middle tooth no more than  $2\frac{1}{2}$  times as wide as 1st lateral teeth; premandible simple; abdominal hair pencils present or absent\*\*; pecten epipharyngis consists of 3 equal-sized teeth.

\*\*The species of the *tremulus*-group which lack hair pencils cannot be distinguished from *Orthocladius*.

### Taxonomic Status

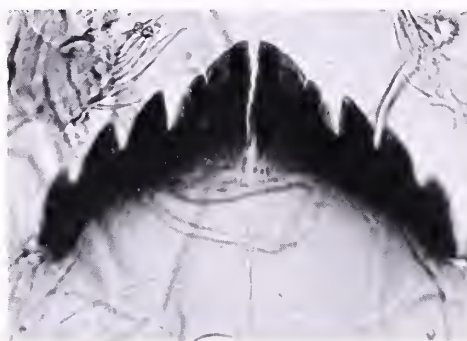
Poor. Larvae of less than half (4 of 9) European species are known and will key in Hirvenoja (1973, p. 185). The larvae will key to couplet 9 in Roback (1957, p. 69) and to *C. tremulus* group in Oliver et al. (1978).

### Distribution and Ecology

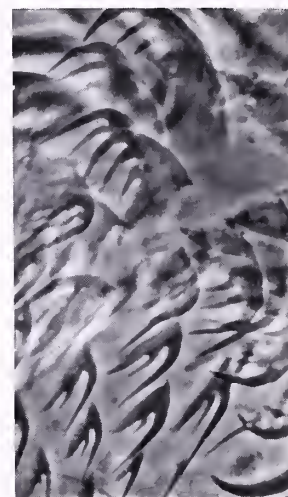
This group is extremely common on multiplate samplers, occurring in all the systems we sampled, and at 203 of the 225 sampling sites. In some systems, it became less abundant in areas with toxic and/or organic water quality problems, but was seldom eliminated. Chemical ranges and environmental requirements have been published for *C. exilis* (Beck, 1977) and *C. nr. exilis* (Roback, 1974), but meaningful tolerances cannot be established until the larval taxonomy is improved.

### References

Hirvenoja (1973) presented keys, descriptions and biological information for the European fauna. Sublette and Sublette (1971) gave a key for adult males of 12 closely related Nearctic species.



labial plate



claws of anterior  
proleg

### Generic Characters

Labial plate with odd number of teeth (usually 13), middle 5 teeth often lighter than outside laterals; labral seta I bifid; some species with hair pencils on abdomen which will distinguish them from *Orthocladius*; other species lack hair pencils and many cannot be distinguished from *Orthocladius*—exceptions include the *bicinctus*-group (serrated inner margin of mandible) and the *trifascia*-group (unique labial plate, this page).

### Specific Characters

Labial plate with 11 teeth, very dark, 1st and 2nd laterals fused with median tooth so that plate may appear 7-toothed, median tooth more than 3 times as wide as 1st laterals; claws of anterior proleg strongly serrated; premandibles simple; abdominal hair pencils very small, sometimes apparently absent; pecten epipharyngis consists of 3 equal-sized teeth.

### Taxonomic Status

Fair. These distinctive larvae key to *C. trifascia* in Hirvenoja (1973) and to *Cricotopus* sp. 1 in Roback (1957), where they were considered to have a 7-toothed labial plate. At present, the group contains only 2 species (Hirvenoja, 1973, pp. 244-250); the larva of only one species (*C. trifascia*) is known.

### Distribution and Ecology

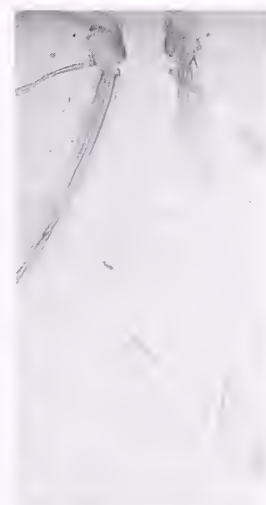
We have found this species usually in rapidly flowing waters, ranging in size from small first-order streams to the main channel of the Niagara River. Its distribution is patchy, having been found at only 10% of our sampling sites, in slightly less than half the rivers surveyed. It appears to be saproxenous. According to Hirvenoja (1973), *C. trifascia* seemingly prefers flowing water. Roback found his *Cricotopus* sp. 1 in 2 rapid to moderately rapid areas, and one area that was slow flowing, turbid, and supported a poor insect fauna.

### References

Hirvenoja (1973) gave larval pupal, and adult descriptions for *C. trifascia*. Roback (1957) included the larva as *Cricotopus* sp. 1.



labial plate



preanal papillae

### Generic Characters

Thorax and abdomen usually with long, coarse hairs; labial plate with 4-5 pairs of lateral teeth, median tooth single or double; inner margin of mandible usually with 1-3 serrations or spines; paralaial plates small, sometimes inconspicuous and never with hairs.

### Specific Characters

Labial plate with 2 pointed, spade-shaped median teeth; paralabial plates long, narrow, and with rounded base; prominent darkened spot below base of paralabial plates; preanal papillae twice as long as wide; mandibles with 2-3 serrations on inner margin; antennal ratio 1.3-1.8; body length 3-4 mm; abdominal setation strong; head color yellow.

### Taxonomic Status

Poor. Although Lehmann (1972) combined the *bavarica*-group and the *discoloripes*-group under the *verralli*-group, their usage is retained here to distinguish the larvae. Associated pupae differ from European species in that they lack recurved hooks on tergite V. Saether (1969) described 2 Nearctic species belonging to the *bavarica*-group, *Eukiefferiella paucunca* and *Eukiefferiella vitracies*.

### Distribution and Ecology

Roback (1957) recorded this species from several locations; we found it at 11 stations. All records indicate that it is rheobiontic and prefers small rivers, streams and tributaries.

### References

Zavřel (1939) gave pupal keys for 20 European species. Roback (1957) described the larva and pupa as *Eukiefferiella* sp. 2, and provided a larval key to 10 species and a pupal key to 7 species. Lehmann (1972) revised the European species, with pupal and adult keys for 26 species.



labial plate



4-segmented antenna

### Generic Characters

Thorax and abdomen usually with long, coarse hairs; labial plate with 4-5 pairs of lateral teeth, median tooth single or double; inner margin of mandible usually with 1-3 serrations or spines; parala-bial plates small, sometimes inconspicuous and never with hairs.

### Specific Characters

Antenna either with 4 segments or with 3rd segment greatly reduced; antennal ratio 1.9-2.1; labial plate with 12 teeth, medians rounded and subequal in width to 1st laterals; mandibles with 4 inner teeth and 2-3 serrations on inner margin; body length of mature specimens less than 3.0 mm; head color brown.

### Taxonomic Status

Poor. Few Nearctic species have yet been described for this large genus; the best current taxonomic treatment is to attempt placement in the proper species group. Group characters listed above were developed from associated material by the junior author (Bode, 1979); the *claripennis*-group has been modified from Lehmann (1972) to exclude *E. brevicealcar* and *E. tirolensis*.

### Distribution and Ecology

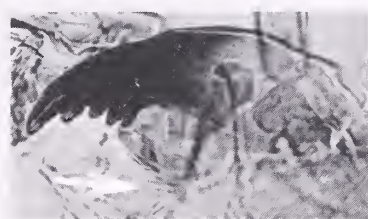
This small larva was occasionally found on multiplates in large rivers. Distribution indicated rheophilic tendencies, and were clean-water except for one collection in an area containing toxic and organic pollution. Therefore it is probably facultative.

### References

Zavřel (1939) gave larval and pupal keys for 20 European species. Roback (1957) described the larva and pupa of *Eukiefferiella brevinervis*, which belongs in the *claripennis*-group. Lehmann (1972) gave pupal and adult keys for 26 European species.



labial plate



spines  
of mandible



body setation

### Generic Characters

Thorax and abdomen usually with long, coarse hairs; labial plate with 4-5 pairs of lateral teeth, median tooth single or double; inner margin of mandible usually with 1-3 serrations or spines; paralaial plates small, sometimes inconspicuous and never with hairs.

### Specific Characters

Labial plate with a single, wide, peaked median tooth and 5 pairs of laterals; preanal papillae 1.5-2.0 times as long as wide; mandibles either smooth on inner margin or with 2-3 spines; antennal ratio 1.6-2.1; body setation strong; head color yellow; body length 4-6 mm.

### Taxonomic Status

Poor. Lehmann (1972) included *E. discoloripes* in the *verralli*-group based on pupae and adults, but based on associated larvae (Bode, 1979) it probably should be separated from *E. bavarica*, *E. calvescens* and *E. verralli*. *Eukiefferiella* sp. 1 of Roback (1957) belongs here, and also *Eukiefferiella* sp. 1 of Oliver et al. (1978).

### Distribution and Ecology

This is the most commonly encountered species of *Eukiefferiella*. We encountered it in nearly every system except sluggish areas such as canalized rivers. It is seemingly tolerant to many toxic substances, but is not usually abundant in organically enriched areas. It is often associated with filamentous green algae, such as *Cladophora*, which it lives in and probably feeds on.

### References

Zavřel (1939) gave larval and pupal keys for 20 European species. Roback (1957) described the larva as *Eukiefferiella* sp. 1, and gave a larval key to 10 species and a pupal key to 7 species.



labial plate



mandible

### Generic Characters

Thorax and abdomen usually with long, coarse hairs; labial plate with 4-5 pairs of lateral teeth, median tooth single or double; inner margin of mandible usually with 1-3 serrations or spines; paralaial plates small, sometimes inconspicuous and never with hairs.

### Specific Characters

Labial plate with 11 teeth, median wide and convex; inner margin of mandible with 2-3 long spines; paralaial plates indistinct; antennal ratio 1.4-1.9; preanal papillae not longer than wide; body length 3.5-7 mm.

Some species in this group are very similar to *Cardiocladius*, but the smaller size, the labial plate, the mandibular spines and the body hairs will distinguish them from *Cardiocladius*.

### Taxonomic Status

Poor. The larva is close to the European *E. longicalcar* as described and illustrated by Zavřel (1939) and Chernovskii (1949). Lehman (1972) placed 3 species in the *potthasti*-group, based on pupae and adults. Group characters listed above were developed from associated material by the junior author (Bode, 1979). Elgmork and Saether (1970) recorded the first Nearctic collection for this group.

### Distribution and Ecology

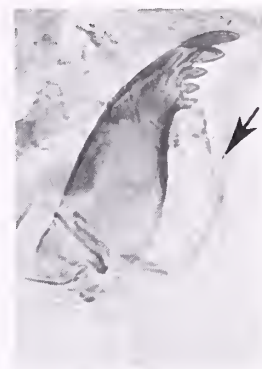
Distribution records thus far indicate rheophilous tendencies, as with other *Eukiefferiella*. This species has also been found in areas of moderate organic and toxic pollution.

### References

This species will key to *E. longicalcar* (a European species) in Roback (1957). Zavřel (1939) gave larval and pupal keys for 20 European species. Lehmann (1972) gave pupal and adult keys for 26 European species.



labial plate  
paralabial plate



serrations  
of mandible

### Generic Characters

Thorax and abdomen usually with long, coarse hairs; labial plate with 4-5 pairs of lateral teeth, median tooth single or double; inner margin of mandible usually with 1-3 serrations or spines; paralabial plates small, sometimes inconspicuous and never with hairs.

### Specific Characters

Paired median teeth of labial plate rounded and about twice as wide as 1st laterals; antennae either 4-segmented or with reduced 3rd segment (as in *E. claripennis* gr.); antennal ratio 1.6-1.9, paralabial plates triangular and fairly prominent; mandibles with 3-4 small serrations on inner margin; length of mature specimens 3-4 mm; head color brown.

### Taxonomic Status

Poor. This larva was not previously described in the literature; the associated pupa is close to the European species *E. pseudomontana*. Lehmann (1972) does not treat *E. pseudomontana* as a group, but associated material for 3 Nearctic species justifies its existence (Bode, 1979). This species will incorrectly key to *E. claripennis* in some keys, based on the 4-segmented antennae.

### Distribution and Ecology

Like most *Eukiefferiella*, this species is rheobiontic, confined to small, swift rivers and streams. It increased in abundance in the plume of a chlorinated sewage effluent in a small stream. In other streams it appeared to be a clean-water species.

### References

Zavřel (1939) gave larval and pupal keys for 20 European species. Lehmann (1972) revised the European species of *Eukiefferiella*, with pupal and adult keys for 26 species. In the key of Oliver et al. (1978) this species will key to *E. claripennis*.



labial plate



antenna — note very short 3rd segment

### Generic Characters

(In part, *marcidus*-group). Labial plate with 2 median teeth and 5 pairs of lateral teeth; antennal segment 3 much shorter than segment 4; antenna apparently 6-segmented (7th segment present but very inconspicuous); antennal blade shorter than combined length of antennal segments 2-6; parala-bial plates distinct, without setae; labral seta I plu-mose; premandible simple.

### Specific Characters

(See Saether, 1975).

### Taxonomic Status

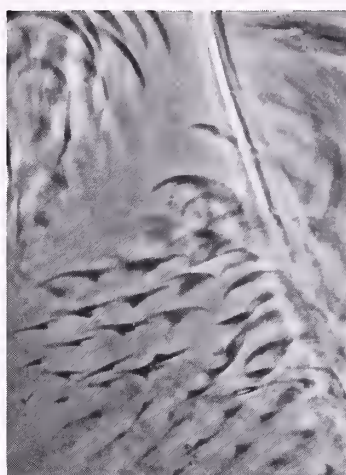
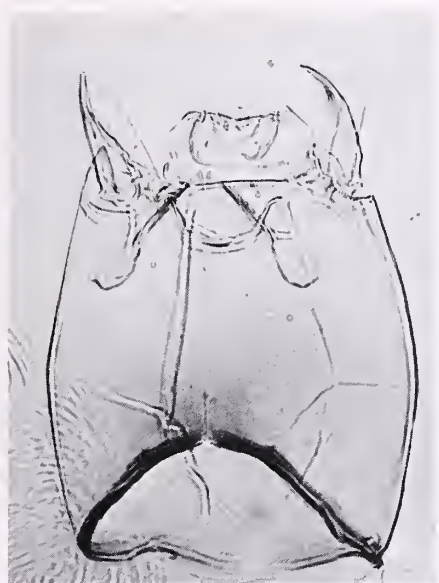
Good. Saether (1975) provided descriptions and keys for all stages of 15 species of *Heterotrissocladius*. This will key to *Heterotrissocladius changi* in Oliver et al. (1978), to *Metriocnemus lundbecki* in Johannsen (1937a), and to *Metriocnemus stylatus* (*Parametriocnemus*) in Roback (1957).

### Distribution and Ecology

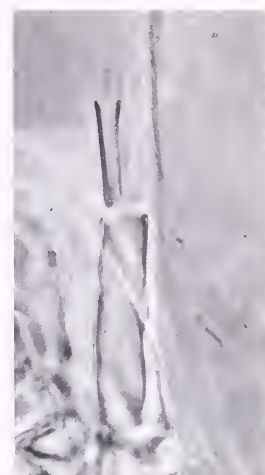
This species has an extremely limited distribution in our sampling network, being found at only 2 rapidly flowing, mesothermal areas. Its inclusion is intended mainly to show the differences between *Heterotrissocladius* and *Parametriocnemus*.

### References

Saether (1975) provided a complete taxonomic treatment for Nearctic *Heterotrissocladius*.



claws of anterior  
proleg



antenna

### Generic Characters

Small larvae (body length 1.5-5.0 mm); paralabial plates large, conspicuous and often wrinkled, but without hairs; labial plate with wide median tooth bearing a pair of small peaks in the middle; preanal papillae without spurs (compare with *Psectrocladius*).

### Specific Characters

Paralabial plates broadly rounded and teardrop shaped; 1st antennal segment 1.1-1.3 times the length of the remaining segments combined; 1st antennal segment 41-46  $\mu$  in length, 2nd segment about  $\frac{1}{2}$  as long as 1st; mandible 82-84  $\mu$  long.

### Taxonomic Status

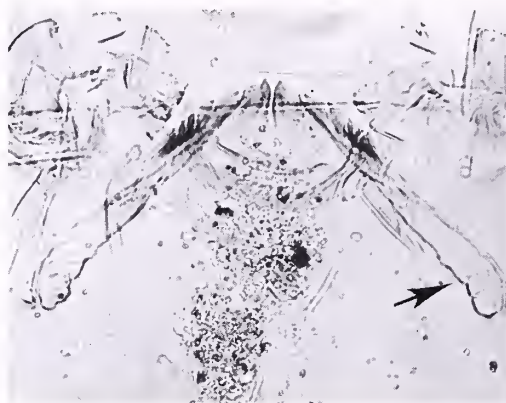
Fair. The larva was previously unknown (Saether, 1977, p. 52); our determination was based on reared material. This species keys to *N. rectinervis* in Saether, but can be distinguished by its lower antennal ratio, shorter head capsule and shorter mandible. This will key to *Psectrocladius* in Mason (1973) and Roback (1957) and to *Nanocladius* sp. 1 in Oliver et al. (1978).

### Distribution and Ecology

Previously, this species was known only from the Missouri River in Nebraska (Saether, 1977, p. 52). We encountered it in 5 of our 17 river reaches. It appears to be rheophilic and saproxenous.

### References

Saether (1977, pp. 51-54) gave original descriptions for the pupa and adults of this species, which are also included in his keys. Fittkau and Lehmann (1970) revised the European fauna of the genus (as *Microcricotopus*).



antenna

note rugose paralabial  
plates

### Generic Characters

Small larvae (body length 1.5-5.0 mm); paralabial plates large, conspicuous and often wrinkled, but without hairs; labial plate with wide median tooth bearing a pair of small peaks in the middle; preanal papillae without spurs (compare with *Psectrocladius*).

### Specific Characters

Paralabial plates narrow and heavily wrinkled (rugose); 1st antennal segment 1.7-1.9 times the length of the remaining segments combined; length of 1st antennal segment 58-60  $\mu$ ; some claws on anterior prolegs weakly pectinate.

### Taxonomic Status

Fair. This species keys to *N. distinctus*, *N. bicolor* in Saether (1977). As mentioned by Saether (p. 29), there may be several species with larvae of this type. This will key to *Psectrocladius* in Mason (1973) and Roback (1957) and to *Nanocladius* sp. 1 in Oliver et al. (1978).

### Distribution and Ecology

This is the most common species of *Nanocladius* encountered in our sampling network. It occurs in slow-moving, organically polluted canals, in a sluggish stream defiled by crude oil and raw sewage, as well as in cleaner areas. It appears to have rather wide tolerances for both organic and toxic substances, and could be classified as facultative. According to Saether (1977) this species appears to be common in lakes and rivers of the Midwest, and in moderately oligotrophic to mesotrophic areas of Lake Winnipeg. The feeding habits of *Nanocladius alternantherae* may also apply to this species. Those larvae prefer to feed on ehironomid eggs and newly hatched larvae, but also consume Aufwuchs — presumably attached algae and microorganisms (Dendy, 1973).

### References

Saether (1977, pp. 25-30) gave original descriptions for all stages, and discussions on the taxonomy and ecology of this species. Fittkau and Lehmann (1970) revised the European fauna of the genus (as *Microcricotopus*).



labial plate

### Generic Characters

Small larvae (body length 1.5-5.0 mm); paralabial plates large, conspicuous and often wrinkled, but without hairs; labial plate with wide median tooth bearing a pair of small peaks in the middle; preanal papillae without spurs (compare with *Psectrocladius*).

### Specific Characters

Claws of anterior prolegs apparently smooth; 1st antennal segment about 1.5\* times the length of the remaining segments combined; 1st antennal segment 41-46  $\mu$  in length; paralabial plates 54-60  $\mu$  in length; head capsule golden (most other species have a light to dark brown head capsule).

\*This figure (1.5) agrees with Saether's drawing of the antenna of *N. minimus*; the antennal ratio in the text, however, is 2.0.

### Taxonomic Status

Fair. Larvae may be keyed in Saether (1977), but are not distinguishable from *N. anderseni*. This will key to *Psectrocladius* in Mason (1973) and Roback (1957) and to *Nanocladius* sp. 1 in Oliver et al. (1978).

### Distribution and Ecology

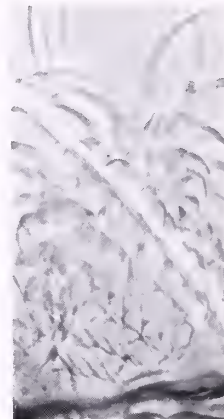
*N. minimus* has been found previously only in Keowee Reservoir, South Carolina, together with *N. incomptus* and a probable *N. spiniplenus*. This reservoir is moderately oligotrophic and probably mesohumic (Saether, 1977). In New York State, this species was much less common than *N. crassicornus*, *N. distinctus*, and *N. spiniplenus*. It appears to be rheophilic, saprophobic, and mesotrophic. For possible feeding habits, see under *N. distinctus*.

### References

Saether (1977, pp. 21-25) gave original descriptions for all stages of *N. minimus*. Fittkau and Lehmann (1970) revised the European fauna of the genus (as *Microcricetopus*).



labial plate



claws of anterior proleg

### Generic Characters

Small larvae (body length 1.5-5.0 mm); paralabial plates large, conspicuous and often wrinkled, but without hairs; labial plate with wide median tooth bearing a pair of small peaks in the middle; preanal papillae without spurs (compare with *Psectrocladius*).

### Specific Characters

Paralabial plates broadly rounded and teardrop shaped; 1st antennal segment 1.3-1.4 times the length of the remaining segments combined; 1st antennal segment 46-58  $\mu$  in length; claws of anterior prolegs strongly pectinate; mandible 91-96  $\mu$  in length.

### Taxonomic Status

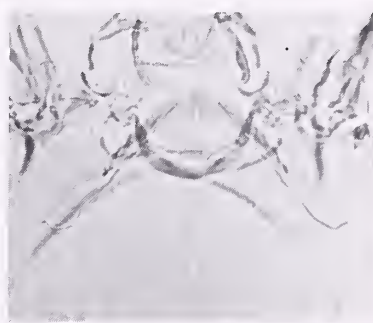
Good. This species keys nicely in Saether (1977). It most closely resembles *N. crassicornus*, but has a distinctively longer mandible, and tends to have a higher antennal ratio and a longer 1st antennal segment. It will key to *Psectrocladius* in Mason (1973) and Roback (1957 — *P. sp. 3*) and to *Nanocladius sp. 1* in Oliver et al. (1978).

### Distribution and Ecology

In Europe, this was an abundant species in the middle and lower reaches of a large river (the Fulda), where it lives on stones or plants in areas with moderate current (Fittkau and Lehmann, 1970, p. 400). The larvae build short sand tubes and pupation occurs in semi-ovoid gelatinous houses covered with sand and detritus (Lindgaard-Petersen, 1972). Our records indicate that this species is rheophilic and saprophilic. It was collected in areas receiving heavy amounts of organic wastes and/or toxic wastes. From these records, it appears to be tolerant of many adverse water quality conditions. Roback's (1974) *Psectrocladius sp. 3* is tolerant of high pH (>8.5) and high BOD (>5.9 ppm). For possible feeding habits, look under *N. distinctus*.

### References

Saether (1977) described all stages and discussed the taxonomy and ecology of this species. Lindgaard-Petersen (1972, pp. 485-488) described the larva and gave some ecological notes. Fittkau and Lehmann (1970) described the adult male and pupa, and gave some biological data for this species (as *Microcricotopus rectinervis*).



labial plate



claws of anterior  
proleg

### Generic Characters

Small larvae (body length 1.5-5.0 mm); paralabial plates large, conspicuous and often wrinkled, but without hairs, labial plate with wide median tooth bearing a pair of small peaks in the middle; preanal papillae without spurs (compare with *Psectrocladius*).

### Specific Characters

Claws of anterior prolegs strongly pectinate; 1st antennal segment 1.2-1.4 times the length of the remaining segments combined; 1st antennal segment 34-38  $\mu$  in length; paralabial plates generally smooth posteriorly, with one or more strong longitudinal wrinkles; occipital margin very dark.

### Taxonomic Status

Good. The larva (as well as the other stages) keys out nicely in Saether (1977). The larva will key to *Psectrocladius* in Mason (1973) and Roback (1957) and to *Nanocladius* sp. 1 in Oliver et al. (1978).

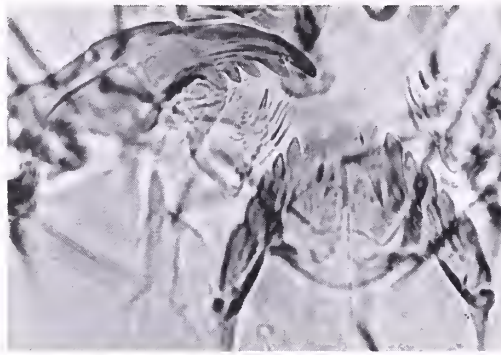
### Distribution and Ecology

According to Saether (1977, p. 42) this species is probably rheophilous. Within New York State, it also appears to be rheophilous, and is found sporadically in moderately clean streams and rivers. It cannot tolerate large amounts of either organic or toxic wastes. For possible feeding habits, look under *N. distinctus*.

### References

Saether (1977, pp. 37-42) presented original descriptions for all stages of this species, and discussions on the taxonomy and ecology.

*Orthocladius (Euorthocladius) Type III sp.*



labial plate



claws of anterior proleg



antenna — note large Lauterborn organs

### Generic Characters

(In part — subgenus *Euorthocladius* Type III.) Labial plate evenly convex with 13 teeth, middle tooth subequal in width to 1st laterals; Lauterborn organs very distinct, rounded, and about as long as 2nd antennal segment; mandible with 5 teeth, outer margin smooth except for notch opposite 5th tooth; labral seta I bifid; claws of anterior proleg strongly pectinate.

### Specific Characters

None.

### Taxonomic Status

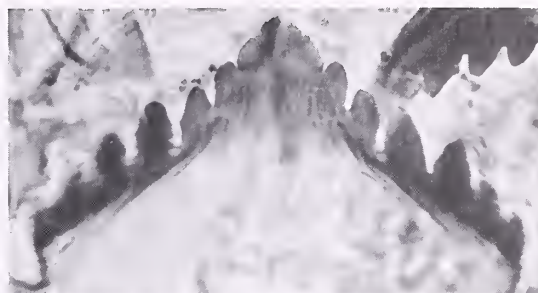
Poor. Sponis (1977) provided a key for distinguishing the subgenera of *Orthocladius* and distinguished 3 larval types for the subgenus *Euorthocladius*. The larva will key to *Spaniotoma (Orthocladius) thienemanni* in Johannsen (1937a), *Hydrobaenus thienemanni* in Roback (1957) and to "*Cricotopus* or *Orthocladius*" in Oliver et al. (1978).

### Distribution and Ecology

We encountered this species in only 4 river systems, at only 12 of our 225 sampling sites. It was most common and abundant in the extremely rapid main stem stations of the Niagara River, along with blackfly larvae (*Simulium vittatum*) and another chironomid, *Cardiocladius obscurus*?. According to Thienemann (1944), European species of this group are all rheobiontic forms. Johannsen (1937a) recorded Group *Euorthocladius* as occurring on stones in swiftly flowing brooks.

### References

Sponis (1977) provided characters for separating the subgenus *Euorthocladius* into Types I, II, and III. Thienemann (1944, pp. 647-649) gave a larval key for 7 European species in this subgenus.



labial plate

mandible with  
crenulate  
outer margin



### Generic Characters

(Note: these characters also apply to larvae of some *Cricotopus*.) Body usually green, sometimes white or yellow; abdomen lacking hair pencils; labial plate convex or triangular, with 13-15 teeth, middle tooth usually wider than 1st lateral teeth; labral seta I bifid; antenna 5-segmented.

### Specific Characters

Labial plate triangular, middle tooth and 1st lateral teeth not clearly separated by a gap; outer margin of mandible wrinkled.

### Taxonomic Status

Fair. All stages may be keyed in Soponis (1977), but the larva is difficult to distinguish from some *Cricotopus*. The pupa is quite distinctive, thus prepupae are valuable for species recognition. The larva will key to *Cricotopus* or *Orthocladius* in Oliver et al. (1978) and to *Hydrobaenus* sp. 2 in Roback (1957).

### Distribution and Ecology

Within our sampling network, this species was found in both small streams and large rivers. Although most locations were relatively free from pollution, some were below mild sources of organic pollution, and one was within 30 meters of a chlorinated sewage treatment plant effluent. This species has been collected from both lakes and rivers (Soponis, 1977), and its environmental requirements were given by Beck (1977). Based on his records, the larvae are rheobiontic, prefer clear water, and can tolerate moderate levels of dissolved oxygen and organic matter.

### References

Saether (1969) described and illustrated the adult male, pupa, and larva. Soponis (1977) described and keyed the mature larva, pupa, and adults of both sexes. Roback (1957) described the larva and pupa as *Hydrobaenus* sp. 2.



### Generic Characters

(Note: these characters also apply to larvae of some *Cricotopus*.) Body usually green, sometimes white or yellow; abdomen lacking hair pencils; labial plate convex or triangular, with 13-15 teeth, middle tooth usually wider than 1st lateral teeth; labral seta I bifid; antenna 5-segmented.

### Specific Characters

Labial plate evenly curved, consisting of 13 teeth, middle tooth at least twice as broad as 1st laterals; premandible simple; outer margin of mandible smooth to weakly crenulate.

### Taxonomic Status

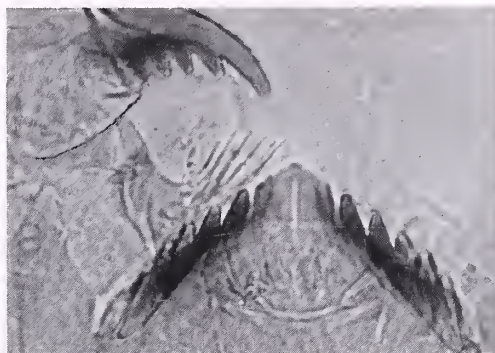
Fair. All stages may be keyed in Soponis (1977), but the larvae are indistinguishable from *O. robacki* and *O. manitobiensis*. The larva will key to "*Cricotopus* or *Orthocladius*" in Oliver et al. (1978), to *Hydrobaenus obumbratus* and *H. paradorens* in Roback (1957), and to *Spaniotoma obunbrata* in Johannsen (1937a).

### Distribution and Ecology

*Orthocladius obumbratus* was encountered commonly on multiplates in most river systems, but was absent from most canals and canalized rivers, thereby appearing rheophilic. Beck (1977) listed this species as saprophobic and Mason (1974) listed it as relatively pollution sensitive. Based on our records, it is saproxenous. Johannsen (1937a) collected the immature stages among algae on the rocks of a small stream and Coffman (1978) listed its food as diatoms, detritus and filamentous algae. The quantity and quality of food on the multiplates seems to be one of the most important factors which determine the abundance of this species.

### References

Soponis (1977) gave descriptions and keys for all stages, plus taxonomic and biological notes.



labial plate



antenna

### Generic Characters

Antenna with 6 or 7 segments, last segment hair-like and difficult to see; labial plate with odd number of teeth, median tooth notched laterally; labral seta I plumose; inner margin of mandible smooth.

### Specific Characters

None.

### Taxonomic Status

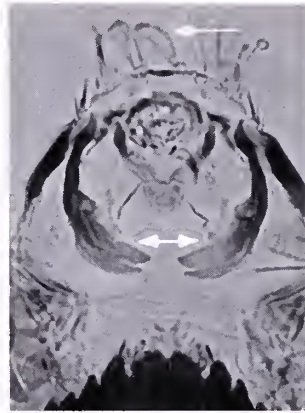
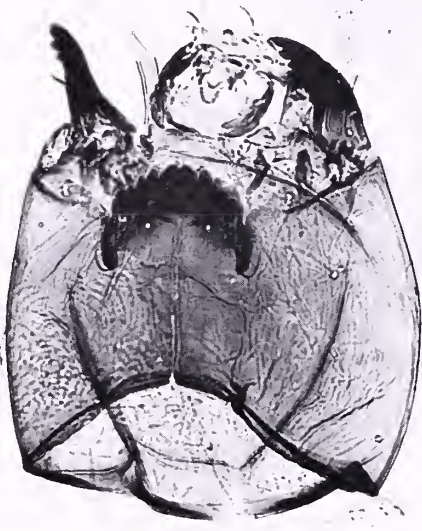
Poor. There is little literature for the North American representatives of this genus. The larva will key to *Parakiefferiella* in Oliver et al. (1978), and to *Eukiefferiella coronata* in Johannsen (1937a) and Roback (1957). Adult males and pupae of European species may be keyed in Brundin (1956, pp. 151-154).

### Distribution and Ecology

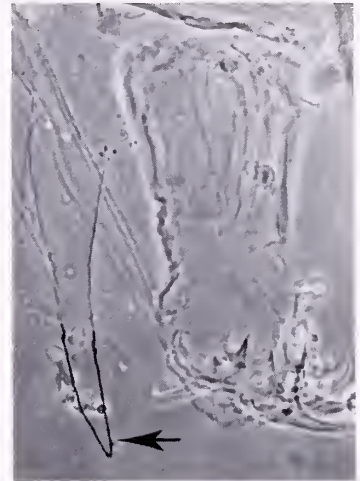
We found these larvae in small, unpolluted streams as well as in moderate-sized rivers and slow-moving eutrophic canals. At the generic level, there seems to be no correlation between their distribution and water quality.

### References

See above.



labral seta I  
premandibles



anal tubule

### Generic Characters

Labial plate with 12 teeth; preanal papillae generally at least twice as long as wide; premandible with 2 or more apical teeth; antennal ratio 1.5-2.0; abdomen without long dark setae.

The larvae are very similar to those of *Heterotrissocladius*, but differ in that the 3rd antennal segment is not much shorter than the 4th segment (compare with p. 46).

### Specific Characters

Antennal ratio about 1.5; middle teeth of labial plate not lighter than lateral teeth; premandible with 2 apical teeth and 1 smaller, more proximal tooth; labral seta I split into 13-15 rays; anal tubules pointed, nearly as long as posterior prolegs, with slight constrictions near middle.

### Taxonomic Status

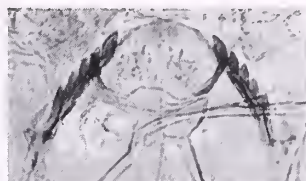
Fair. These larvae key to *Metriocnemus lundbecki* in Johannsen (1937a) and Roback (1957), but there are additional Nearctic species that are not included in those keys. Selected stages of 4 Nearctic species of *Parametriocnemus* have been described by Saether (1969).

### Distribution and Ecology

This species was found in less than half of the systems we surveyed, and appears to be restricted to relatively clean water. In several different systems, it disappeared below inputs of sewage wastes, but eventually reappeared as water quality improved. Beck (1977) listed this species as saprophobic, and unable to tolerate high levels of turbidity or low levels of dissolved oxygen. Roback (1974) provided chemical data for this species (as *Metriocnemus lundbecki*). The larvae are collectors-gatherers and feed on algae and detritus (Coffman et al., 1971; Coffman, 1978).

### References

Saether (1969, pp. 108-123) described the larvae, pupa and adult of this species, as well as selected stages of three other Nearctic species in the genus.



labral seta I

paralabial plate with  
setae

### Generic Characters

Preanal papillae elongate, with spur laterally or basally; paralabial plates large and bearing setae; antennae long and slender,  $\frac{1}{4}$  to  $\frac{1}{3}$  as long as head.

### Specific Characters

(*psilopterus*-group). Labial plate with a broad median tooth, lighter in color than the lateral teeth; labral seta I split into 4 or more branches; spur of preanal papilla not bifid, either simple or composed of numerous wart-like bumps.

### Taxonomic Status

Poor. This will key to *P. elatus* in Roback (1957) and to *P. simulans* in Oliver et al. (1978), but differs from those species in that the middle tooth of the labial plate is not notched in the middle. The structure of the labial plate most closely resembles *P. medius*, a Russian species (Chernovskii, 1949).

### Distribution and Ecology

This larva was found mainly in moderate to large-sized rivers, and appeared to occasionally tolerate mild toxicity, but was not found in organically enriched areas. Environmental tolerances for *P. elatus*, another member of the *psilopterus*-group, were given by Beck (1977), and Mason (1974) provisionally classified that species as pollution sensitive. Wülker (1956) mentioned that the larvae of the *psilopterus*-group reside in tunnel-like cases affixed to the substrate.

### References

Adult males of 7 Nearctic species of *Psectrocladius* may be keyed in Sublette (1967b). Wülker (1956) gave pupal and adult keys for 14 European species.



labial plate, paralabial  
plates with row of setae

### Generic Characters

Labial plate with 12 or 14 teeth, median teeth spade-like; paralabial plates conspicuous and with a more or less linear row of setae; antennal ratio about 1.5; labral seta I bifid; abdomen lacking dark setae.

### Specific Characters

Preanal papillae with 3 setae; setae on paralabial plate located on lateral  $\frac{1}{3}$ ; labial plate with 14 teeth.

### Taxonomic Status

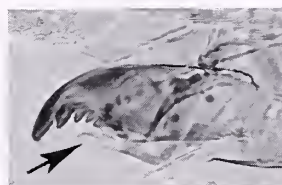
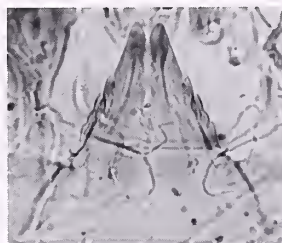
Poor. Of the 6 known Nearctic species (Lehmann, 1969), the larvae of only 2 (*R. robacki* and *R. pauciseta*) have been described. This larva will key to *Spaniotoma fusciceps* in Johannsen (1937a), *Trichocladius* sp. 3 in Roback (1957) and *Rheocricotopus* sp. 2 in Oliver et al. (1978). Lehmann (1969) gave a key (in English) for male adults and male pupae of the European species.

### Distribution and Ecology

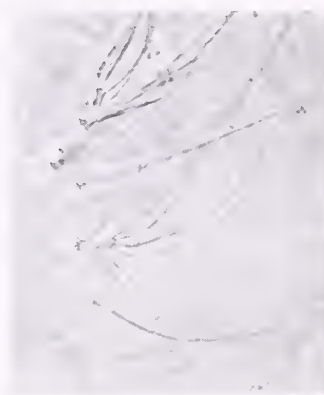
This species was found in only four river systems, but occasionally was an abundant and important species. It apparently is restricted to swiftly flowing waters and is somewhat tolerant of organic and toxic pollutants. Beck (1977) listed *R. robacki* as rheobiontic, mesoxyphilous, eutrophic and facultative to saproxenous. Roback (1974) gave one set of chemical data points for a habitat of this species (as *Trichocladius* sp. 3).

### References

The original description of *Rheocricotopus robacki* (as *Trichocladius*) included a brief description of the larva (Beck and Beck, 1964). Saether (1969) emended the genus and described 3 new Nearctic species, including a larval description for *R. pauciseta*. Thienemann (1944) included three larval types containing 12 European species. Lehmann (1969) described male adults and male pupae of the European species.



mandible with spines on inner margin



multi-rayed setae of abdomen

### Generic Characters

Abdominal segments I-VII each with 2 simple and 2 compound setae on each side, the latter being divided into about 12 rays; apex of 2nd antennal segment expanded; labial plate with stellate bristle on each side near base (often difficult to see); median teeth of labial plate much longer than lateral teeth.

### Specific Characters

None. The larvae are indistinguishable from those of *S. semivirens*, but the adults of several reared specimens belong to a new species (Oliver, personal communication).

### Taxonomic Status

Poor. The genus is fairly easy to recognize, but the species cannot be distinguished. This larva will key to *Spaniotoma semivirens* in Johannsen (1937a) and *Hydrobaenus semivirens* in Roback (1957). Because it has spines on the inner margin of the mandible, it will key to *Eukiefferiella paucunca* in Oliver et al. (1978).

### Distribution and Ecology

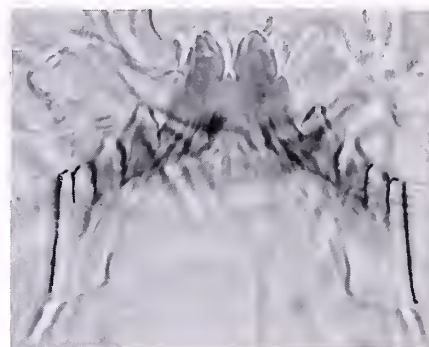
This species was found in small to moderate-sized rivers, in waters ranging from clean to mildly enriched. From our records, it appears to be rheobiontic and saproxenous. In one stream, it was most abundant below the chlorinated effluent from a small, efficient sewage treatment plant. It was present only rarely in canalized rivers. Johannsen (1937a) found the larvae of *S. semivirens* in swiftly flowing water, living in gelatinous tubes in which sand grains were often imbedded.

### References

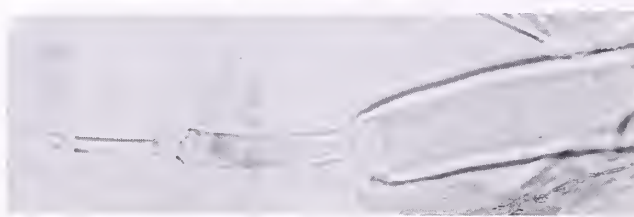
See above.



labial plate



antenna



### Generic Characters

Antenna at least half as long as head, but not longer than head, 5-segmented, 2nd segment usually dark (does not apply to this species); small larvae, body length 5 mm or less.

### Specific Characters

Middle tooth of labial plate small and recessed between 1st laterals; 1st and 2nd lateral teeth of labial plate partially fused; 2nd antennal segment golden, not dark brown, approximately twice as long as 3rd antennal segment.

### Taxonomic Status

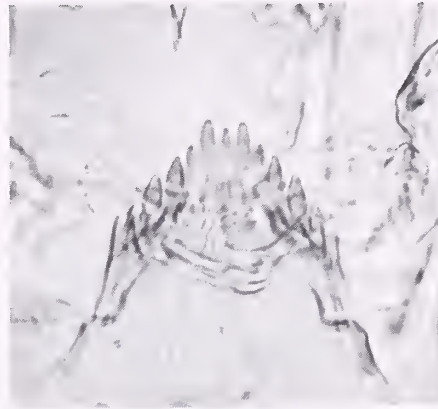
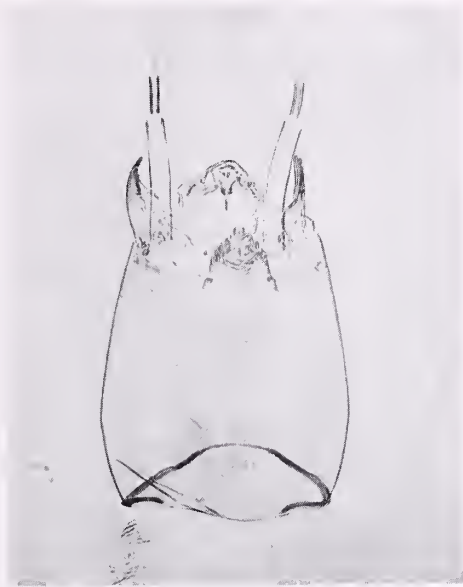
Poor. This does not correspond with either of the *Thienemanniella* larvae described by Roback (1957), although it will key to *Corynoneura* (*Thienemanniella*) sp. 2. It shares the light-colored 2nd antennal segment with *T. fusca* (Thienemann, 1944, p. 651), but lacks the 2 rings of hairs on the abdominal segments. It will key to *T. sp. 3* in Oliver et al. (1978).

### Distribution and Ecology

This is less common than *Thienemanniella* prob. *xena* and is primarily associated with the Great Lakes watershed. Its greatest abundance was in the bay-like mouth of the Black River (in Lake Ontario) and 13 of the 20 stations where it was found were in the main stem of the St. Lawrence River.

### References

This larva will key to genus only in Johannsen (1937a) and Roback (1957). There is a key for 4 species of Nearctic adults of *Thienemanniella* in Sublette (1970). Larvae of 7 European species were keyed in Thienemann (1944).



labial plate



antenna

### Generic Characters

Antennae at least half as long as head, but not longer than head, 5-segmented, 2nd segment usually dark; small larvae, body length 5 mm or less.

### Specific Characters

Labial plate with 13 teeth, middle tooth nearly as long as 1st laterals; antennae about 0.65 times as long as head; antennal ratio about 1.5; 2nd antennal segment dark brown and approximately as long as 3rd antennal segment.

### Taxonomic Status

Fair. This larva will key to *T. xena* in Roback (1957) (under the genus *Corynoneura*), but there may be other species with the same characters. Adults of 4 Nearctic species of *Thienemanniella* may be keyed in Sublette (1970, p. 89).

### Distribution and Ecology

This species is extremely widespread and common, being found in all but three of the river systems we sampled. It also shows some promise as a species sensitive to organic pollution. Its abundance was often inversely proportional to saprophilous Chironomini such as *Glyptotendipes lobiferus* and *Dicortendipes nervosus* Type II. It also disappeared where toxic substances were introduced, and reappeared downstream as water quality improved. Beck (1977) listed *T. xena* as saprophobic, mesoxyphilous and rheobiontic and Mason (1974) provisionally classified it as pollution sensitive. Roback (1974) gave chemical data for one habitat of *T. xena*. The larvae apparently feed mainly on diatoms (Roback, 1957).

### References

The larva of *T. xena* was described by Roback (1957) and both the larva and pupa are included in his keys. Adults of 4 Nearctic species were keyed in Sublette (1970). Thienemann (1944) gave a larval key for 7 European species.

## SUBFAMILY CHIRONOMINAE

### TRIBE CHIRONOMINI

#### Distinguishing characteristics

The larvae have a well-defined labial plate as well as a pair of prominent, striated paralabial plates that are usually widely separated. The mandibles are usually large, have prominent lateral teeth, and an inner mandibular brush. The antennae are usually sessile; if they do originate from tubercles, the tubercles are no longer than wide (Fig. 5e).

#### Taxonomy

A relatively high number of larvae in this tribe can be determined to species using existing keys. Some genera such as *Chironomus*, *Cryptochironomus*, and *Polypedilum* still present formidable problems to the larval taxonomist. Adults may be identified using Townes (1945), and although some of the generic names must be changed to conform with today's classification scheme, the species keys are still fairly accurate.

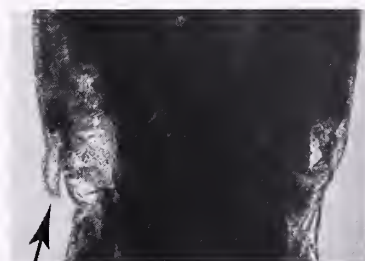
#### Biology

Many species of Chironomini are adapted to living in warm, standing water. Some species can withstand prolonged periods of anaerobic conditions and have developed hemoglobin to accommodate these conditions (Oliver, 1971). Almost all the larvae build cases on or within the substrate, many burrow in soft sediments. Many species are microphagous, filtering small plant and animal material from the water with nets made from salivary secretions (Walshe, 1951). Some larvae (e.g., *Cryptochironomus*) are predaceous.

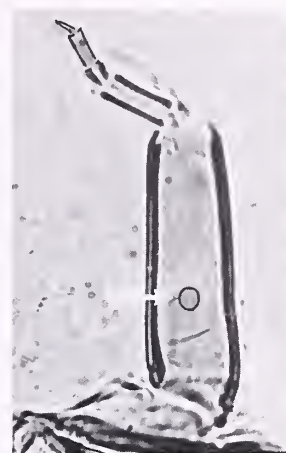
As with all the Chironomidae, members of this tribe are found over a wide range of water quality conditions. The dominance of saprophilic species such as *Glyptotendipes lobiferus* and *Dicoretendipes nervosus* Type II on multiplate samplers is a good indication of eutrophic conditions.



pecten epipharyngis



postero-lateral tubule of  
10th body segment



ring organ

antenna

## Generic Characters

Median tooth of labial plate trifid, often appearing to be 3 separate teeth; body segment 11 with 2 pairs of ventral tubules\*; paralabial plates longer than width of labial plate; premandibles bifid; antenna 5-segmented.

## Specific Characters

Mature larva relatively small (for *Chironomus*), body length 12-16 mm; postero-lateral margin of body segment 10 with a short tubule\*; basal mandibular tooth pale; ring organ located near the basal 1/3 of the 1st antennal segment; pecten epipharyngis with less than 18 teeth; proportions of antennal segments 40:10:3:4:2.

\* These characters are easiest to see under a dissecting microscope, before the specimen is slide mounted (see p. 5).

## Taxonomic Status

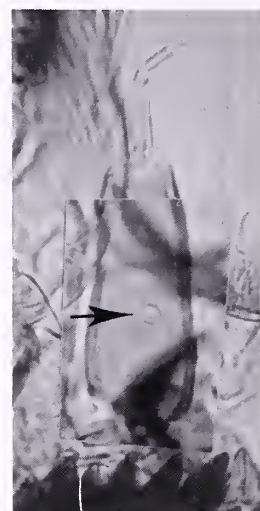
Poor. This is a large and extremely difficult genus. There are 20 species in Townes (1945) and there are approximately 15 additional species that await description (Sublette, personal communication). Cytological methods are necessary to differentiate many species (Wülker, et al., 1971). Larvae and pupae of 7 species may be keyed in Roback (1957) as *Tendipes* (*Tendipes*) [= *Chironomus* (*Chironomus*)].

## Distribution and Ecology

The genus *Chironomus* is ecologically versatile with various species living in standing and flowing, polluted and clean waters (Wülker, et al., 1971). We occasionally found large populations and/or several species in shoreline and benthic mud samples, but never found them to be particularly abundant or diverse on multiplate samplers. This is probably due to their preference for burrowing in soft sediments, which is found on artificial substrates only in very sluggish and turbid water. *Chironomus decorus* group was the most common form of the genus found on artificial substrates. Even in eutrophic waters they do not become very abundant on multiplate samplers, but are present in communities dominated by *Glyptotendipes lobiferus* or one of the species of *Dicrotendipes*. This group is synonymous with *C. attenuatus* (Sublette, personal communication), which has been reported from many adverse water quality conditions (Beck, 1977; Roback, 1974).

## References

Beck (1977) listed 10 ecological references for this group under *C. attenuatus* (a junior synonym). Sublette (1964) listed 20 references, also as *C. attenuatus*. Curry (1962) included 9 species in his larval, pupal, and adult keys. Walshe (1951) described the feeding mechanism for larvae of 6 species of *Chironomus* (*Chironomus*) under the name *Tendipes* (*Tendipes*).



ring organ

antenna

### Generic Characters

Median tooth of labial plate trifold, often appearing to be 3 separate teeth; body segment 11 with 2 pairs of ventral tubules\*; paralabial plates longer than width of labial plate; premandibles bifid; antenna 5-segmented.

### Specific Characters

Mature larva relatively small (for *Chironomus*), body length 12-16 mm; postero-lateral margin of body segment 10 without a small tubule\*; ring organ located near the basal 1/3 of the 1st antennal segment; proportion of antennal segments 48:11:2:3:2.

\* These characters are easiest to see under a dissecting microscope, before the specimen is slide mounted (see p. 5).

### Taxonomic Status

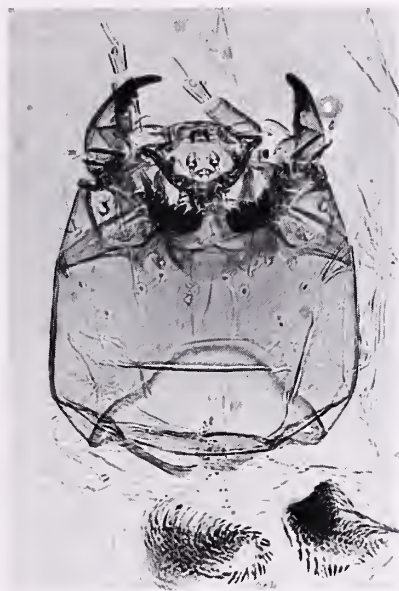
Poor. Even the adults of this large genus are difficult to differentiate (see preceding page). Larvae and pupae of 7 species will key in Roback (1957); adults of 20 species will key in Townes (1945).

### Distribution and Ecology

This group seems more capable of colonizing multiplate samplers in moderate currents than the *decorus*-group. Curry (1954) and Roback (1953) also found this species in flowing waters. The 5 references for *C. riparius* listed by Beck (1977) indicate that this group occurs over a wide range of habitat types (streams and ponds) and water quality conditions. *Chironomus riparius* can tolerate adverse water quality conditions such as high BOD (15.4 ppm), low dissolved oxygen concentrations (1.0 ppm), and others (Roback, 1974). Neither group of *Chironomus* was found on artificial substrates in particularly clean water, although they were sometimes common in bottom samples of clean rivers.

### References

Beck (1977) gave 5 references with environmental requirements and pollution information for *Chironomus riparius*. Roback (1974) gave ranges for various chemical parameters. Credland (1973) concluded that *C. thummi* is a junior synonym of *C. riparius*. Walshe (1951) described the feeding habits of this larva as *Tendipes* (*Tendipes*) *dorsalis riparius*.



labial plate, antenna



mandible

### Generic Characters

Labial plate with concave anterior margin, a pale, dome-shaped median tooth and 5 pairs of lateral teeth (5th laterals may be notched); antenna 5-segmented and with blade attached to 2nd segment; premandible with 4-6 blades; head small in relation to rest of body.

### Specific Characters

Mandible with apical tooth about twice as long as combined width of the 2 lateral teeth, lateral teeth parallel-sided basally and acutely pointed apically; 2nd and 3rd antennal segments about equal in length.

These characters have been derived from existing keys and from specimens of *C. fulvus* that were identified with associated pupae. They undoubtedly apply to several species of *Cryptochironomus*.

### Taxonomic Status

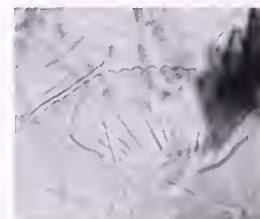
Poor. Existing larval keys contain 2-5 species of *Cryptochironomus*; Townes' (1945) adult key contains 6 species. Coffman (1978) estimates that there are 20 or more species in North America. Each of the taxa in these keys probably contain several species. Larval/pupal associations are extremely valuable, because the pupae are more distinctive than the larvae or adults (Sublette, 1964).

### Distribution and Ecology

This taxon was found most commonly in bottom samples, but did occur occasionally on multiplate samplers. It was never found in grossly polluted areas, but did occur over a wide range of habitat types and water quality conditions. Beck's (1977) tabulation of references also displays a wide range of environmental requirements for *Cryptochironomus fulvus* and Roback (1974) listed *C. nr. fulvus* as occurring in areas with high pH, high chlorides, and low dissolved oxygen. Based on existing records, this taxon is facultative, but narrower environmental tolerances may be found as the species in the group are separated from one another. The larvae are predaceous and are known to feed on oligochaete worms and small chironomid larvae (Darby, 1962).

### References

Various larval and pupal types of *Cryptochironomus* were described by Roback (1957), Curry (1958) and Sublette (1964). Sublette (1964) summarized the taxonomic status of *C. fulvus* and gave 10 references for taxonomy and biology. Coffman (1978) listed 10 ecological references for *Cryptochironomus*, many of which concern the benthos of lakes.



paralabial plate

mandible

premandible

antenna

labial plate

### Generic Characters

Labial plate with 11-13 teeth, median tooth about as long as 1st laterals; paralabial plates not as long as width of labial plate, anterior margins undulate; premandibles bifid; pecten epipharyngis with 7 teeth or less.

### Specific Characters

Head capsule with dark stripe dorsally; 1st and 2nd lateral teeth of labial plate partially fused; 1st antennal segment about 3 times as long as 2nd segment; median tooth of labial plate slightly notched; inner blade of premandible twice as wide as outer blade; mandible with 3 pointed inner teeth.

### Taxonomic Status

Good. The larvae can be keyed in Roback (1957), Webb (1972) or Beck (1976). This keys to *Chironomus* (*Limnochironomus*) *modestus* in Johannsen (1937b) and to *D. sp. 1* in Oliver et al. (1978).

### Distribution and Ecology

This is a common species, being found in all but one system sampled, and in many cases it is the most abundant organism. Mason et al. (1971) provisionally listed *Dicrotendipes neomodestus* as pollution-sensitive. In our surveys it was found to be sensitive to most forms of toxic pollution, but thrived in areas containing high levels of nutrients or organic wastes. In such environs, it is frequently associated with *Dicrotendipes nervosus* Type I and *Polypedilum convictum*. Although abundant in these situations, *Dicrotendipes neomodestus* is found in smaller numbers in a wide range of stream sizes and current speeds. Beck (1977) listed this species as limnobiontic.

### References

Townes (1945) gave an adult key for 10 Nearctic species as *Limnochironomus*, a subgenus of *Tendipes* (pp. 102-110). Webb (1972) provided a larval and pupal key for 6 species of *Dicrotendipes*. Beck (1976) gave a larval key for 6 species of *Dicrotendipes*.



labial plate



mandible, showing  
compound inner tooth

### Generic Characters

Labial plate with 11-13 teeth, median tooth about as long as 1st laterals; paralabial plates not as long as width of labial plate, anterior margins undulate; premandibles bifid; pecten epipharyngis with 7 teeth or less.

### Specific Characters

Labial plate with 1st and 2nd lateral teeth not fused, median tooth slightly notched; 3rd inner tooth of mandible equally compound\*; inner blade of premandible about twice as wide as outer blade; 1st antennal segment 2.2-2.5 times as long as 2nd segment.

\* Compare with *D. nervosus* Type II (next page).

### Taxonomic Status

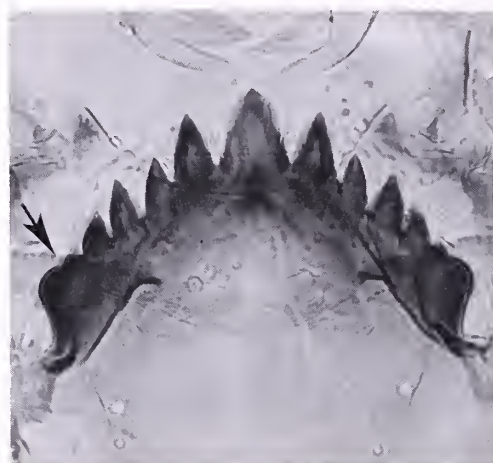
Fair. Although this species will key out in Roback (1957), Webb (1972), Beck (1976), and Oliver et al. (1978), *D. nervosus* now appears to be a complex. Our specimens exhibit 2 larval types, of which the reared adults are inseparable. Townes (1945) noted 2 varieties of *D. nervosus* based on coloration of the adult abdomen and illustrated 3 different types of genitalia.

### Distribution and Ecology

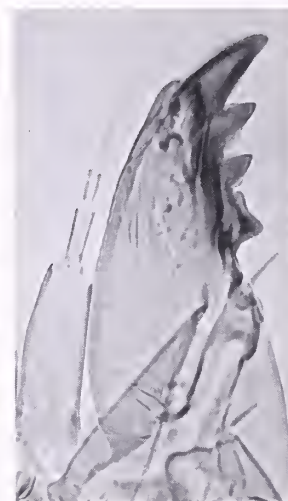
This species is common, widespread, and sometimes abundant. Its distribution is most closely associated with slow currents and high levels of organic matter, such as in certain sections of the New York State Barge Canal. It is usually absent in swifter flowing or pristine environments. Roback (1974) listed *D. nervosus* as occurring in situations of high chlorides, high BOD, and low dissolved oxygen. Our collection records below sewage outfalls verify this tolerance to waste discharges. *D. nervosus* is often found in abundance with *Glyptotendipes lobiferus* in these situations.

### References

This is one of 10 Nearctic species included in Townes (1945) under the name *Tendipes*, subgenus *Limnochironomus*. Webb (1972) provided larval and pupal keys for 6 species of *Dicrotendipes*. Beck (1976) gave a larval key for 6 species of *Dicrotendipes*.



labial plate, showing fused  
5th and 6th laterals



antenna      mandible

### Generic Characters

Labial plate with 11-13 teeth, median tooth about as long as 1st laterals; paralabial plates not as long as width of labial plate, anterior margins undulate; premandibles bifid; pecten epipharyngis with 7 teeth or less.

### Specific Characters

Differs from *D. nervosus* Type I in these respects: 3rd inner tooth of mandible unequally compound; 5th and 6th lateral teeth of labial plate fused; 1st antennal segment more than 3 times length of 2nd segment.

### Taxonomic Status

Fair. This form almost certainly corresponds to *Einfeldia* in Mason (1968, 1973). We have reared several of these, and the adults are identical to *D. nervosus*. Because there are significant morphological and ecological differences in the larvae, we are treating these as two forms of *Dicrotendipes nervosus*.

### Distribution and Ecology

This is often the dominant species in rivers containing both sewage and toxic wastes, and is usually not found in relatively clean waters. It exhibits a high tolerance to many types of pollution, and thus proliferates where many other organisms cannot survive. Its most common associates in such situations are the oligochaetes *Nais communis*, *Dero obtusa*, and *Stylaria lacustris*.

### References

Townes (1945) gave an adult key for 10 species of *Tendipes* (*Limnochironomus*). This larva keys out near *Tendipes* (*Limnochironomus*) *nervosus* in Roback (1957). Mason (1968, 1973) listed and pictured this species as *Einfeldia* sp. Webb (1972) gave a larval key for 6 species of *Dicrotendipes*.



labial plate, paralabials

### Generic Characters

Labial plate with 16 teeth, median teeth partially fused and about even in length with 1st laterals, paralabial plates about as long as width of labial plate, striations most distinct near center; mandibles with 3 inner teeth, outer margin rugose; antennae 5-segmented.

### Specific Characters

Labial plate with 2nd laterals shorter than 1st and 3rd laterals; paralabial plates about 4 times longer than wide, antennal ratio 1.4.

### Taxonomic Status

Good. The genus now contains only 2 North American species, *E. nigricans* and *E. subtendens* (Sublette, pers. comm., 1978), of which the larvae can be identified to species. Other species that were assigned to this genus in Mason's key (1973) now belong to *Demeijerea* (these larvae have labial plate with an odd number of teeth).

### Distribution and Ecology

*Endochironomus nigricans* was commonly encountered in medium to large rivers, and especially in canalized sections. It was most prevalent in areas of high nutrient and organic levels, and often was associated with large numbers of *Glyptotendipes lobiferus* and *Dicortendipes neomodestus* in these situations. Roback (1974) listed *E. nigricans* as occurring in areas of high alkalinity, chloride, and sulfate. Coffman (1978) listed some *Endochironomus* as herbivores and shredders, and Berg (1950) found *E. nigricans* living in rolled leaves of *Potamogeton* and spinning nets for feeding. Paine and Gaufin (1956) found *E. nigricans* to be an indicator of an unpolluted habitat.

### References

Roback (1957) distinguished the 2 species of *Endochironomus* on the basis of body color (p. 120). Walshe (1951) described the larval feeding mechanism for 3 species of *Endochironomus*.



labial plate, paralabials

### Generic Characters

Labial plate with 16 teeth, median teeth partially fused and about even in length with 1st laterals; paralabial plates about as long as width of labial plate, striations most distinct near center; mandibles with 3 inner teeth, outer margin rugose; antennae 5-segmented.

### Specific Characters

2nd lateral teeth of labial plate not markedly shorter than 3rd laterals; pigmentation of labial plate does not extend posteriorly from the teeth; paralabial plates about 3 times as long as wide; antennal ratio 1.6.

### Taxonomic Status

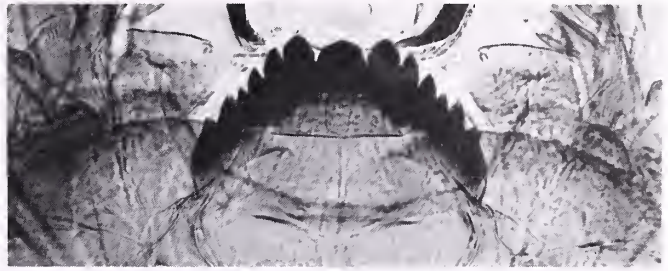
Good. The genus now contains only 2 North American species, *E. nigricans* and *E. subtendens* (Sublette, pers. comm. 1978), of which the larvae can now be identified to species. Species with labial plate having an odd number of teeth which were assigned to this genus in Mason's key (1973) now belong to *Demeijerea*.

### Distribution and Ecology

*Endochironomus subtendens* was less common than *E. nigricans*, though it was consistently found throughout the St. Lawrence River. Limited distributional data suggests possible affinities for enriched waters and lake outlets.

### References

Roback (1957) gave larval and pupal keys distinguishing the larvae of the 2 species of *Endochironomus* on the basis of body color. Walshe (1951) described the larval feeding mechanism for 3 species of *Endochironomus*.



labial plate, paralabials



accessory  
tooth of  
mandible



pecten epipharyngis

### Generic Characters

Labial plate with 13 teeth, the median tooth wide and low; paralabial plates at least twice as long as wide and with undulate anterior margin; pecten epipharyngis with more than 7 teeth; antenna 5-segmented; premandibles bifid.

### Specific Characters

Median tooth of labial plate wider than long, about even with or slightly shorter than 1st laterals; 1st lateral teeth of labial plate about twice as wide as 2nd laterals; paralabial plates longer than width of labial plate; pecten epipharyngis with about 15 irregular teeth; mandible with a broad accessory tooth; 11th body segment without ventral tubules.

### Taxonomic Status

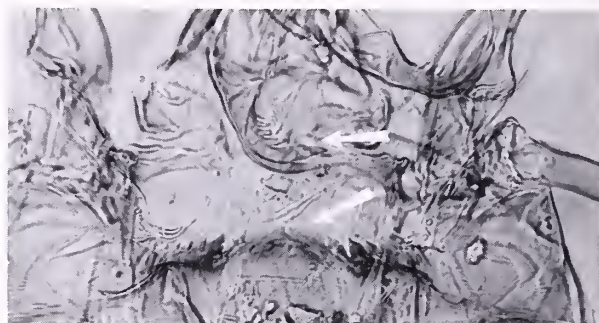
Fair. 5 species can be keyed as larvae in Roback (1957, p. 123), including *G. lobiferus*. Townes (1945, pp. 136-146) has keys for separating 13 species of adults (including *G. lobiferus*).

### Distribution and Ecology

*Glyptotendipes lobiferus* is a common inhabitant of slow-moving rivers and streams in New York State. It is especially prevalent in canalized sections and often becomes the dominant species in areas polluted by sewage wastes. Its abundance is often accompanied by high numbers of *Dicrotendipes neomodestus*, *Dicrotendipes nervosus* Type II, and the oligochaete *Nais communis*. Most sources in Beck (1977) found this species to be a burrower and to prefer standing water. Mason et al. (1971) provisionally classified *Glyptotendipes lobiferus* as pollution tolerant. Larvae of *Glyptotendipes* build large tubular cases that are permanently attached to the substrate. To feed, they spin a net with their saliva across one end of the case, turn around and draw a current through the case by undulating the body, then turn around again and feed on the particles trapped within the net (Walshe, 1951).

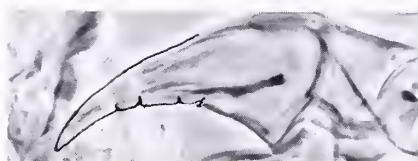
### References

Roback (1957) gave larval and pupal keys for 5 species of *Glyptotendipes*. Lavalley (1976) studied the emergence and reproductive behavior of *Glyptotendipes lobiferus*. Coffman (1978) listed 13 ecological references for *Glyptotendipes*.



labial plate

premandible



mandible

### Generic Characters

Labial plate straight or convex, with 15-16 teeth, median tooth (or teeth) somewhat lighter than lateral teeth; labral sensilla elongate; basal segment of maxillary palp about 4 times as long as wide and more than  $\frac{1}{2}$  as long as basal antennal segment; antenna with 5 segments, the 2nd segment about as long as 3rd segment; antennal blade shorter than antennal segments 3-5.

### Specific Characters

Labial plate nearly straight, 1st laterals partially fused with the notched median tooth; paralaial plates with striations strongest near center; mandibles pale with flattened, barely discernible teeth; premandibles with 2 large and 3-4 smaller teeth.

### Taxonomic Status

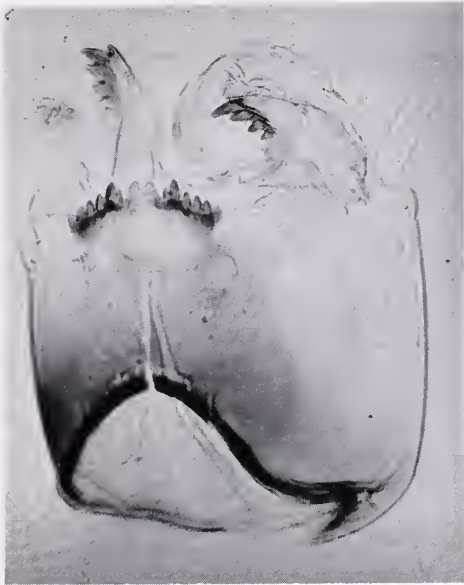
Poor. Generic limits for larvae of this genus and other closely related genera have been difficult to establish. Saether (1971, 1977) and Jackson (1977) have helped to clarify generic limits for the *Harnischia* complex. The above larva will key to *Harnischia nais* in Roback (1957) and *H. curtilamellata* in Oliver et al. (1978). Adults may be keyed in Townes (1945, pp. 153-155).

### Distribution and Ecology

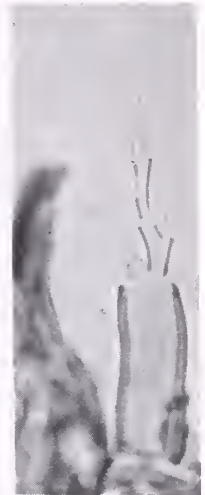
We found this species occasionally in small rivers and streams. It appears to be limited to relatively clean waters. Coffman (1978) listed 4 ecological references for *Harnischia*.

### References

Mason (1968, 1973) pictured this species as *Chironomus* (*Cryptochironomus*) *nais* and *Paracladopelma*, respectively. Saether (1971) added to existing descriptions for this species and discussed problems of establishing generic limits within the *Harnischia* complex. Saether (1977) gave generic keys for larvae, pupae and adults of the *Harnischia* complex.



labial plate, paralabials



6-segmented  
antenna

### Generic Characters

Labial plate with 2-3 light median teeth and 6 pairs of lateral teeth, 1st lateral teeth partially fused with 2nd laterals; antennae 6-segmented; paralabial plates not as long as width of labial plate.

### Specific Characters

Median teeth of labial plate about as long as 2nd laterals and sometimes with a small single tooth between them; posterior ½ of head capsule darkly pigmented; premandibles usually bifid, occasionally with a small 3rd tooth; proportions of antennal segments 25:4:4:3:3:1.

### Taxonomic Status

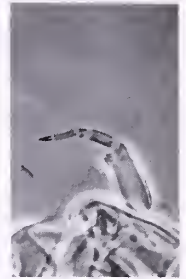
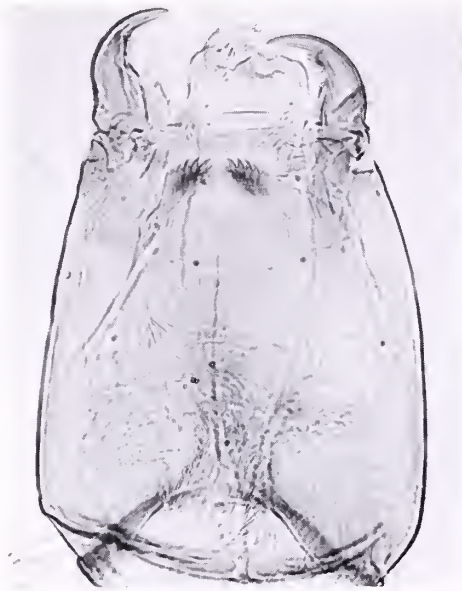
Fair. Sublette and Sublette (1965) listed 4 species of *Microtendipes*, but the immatures of only two species can be keyed (Roback, 1957). The genus can be determined in most larval keys. This species will key to *M. tarsalis* (a European species) in Roback (1957), due to the small median tooth of the labial plate.

### Distribution and Ecology

This genus seems to bear more affinity to the Tanytarsini than the Chironomini, at least ecologically. It is not embenthic (burrowing), as are most Chironomini, but is epibenthic and rheobiontic, preferring cold, fast river and stream habitats. Coffman (1978) listed *Microtendipes* as net spinners and filter-feeders and gave 6 ecological references. *Microtendipes caelum* is often found associated with Tanytarsini and several species of the mayfly genus *Stenonema*, usually in areas supporting a rich, well-balanced fauna. Though frequently encountered, it is rarely found in great numbers.

### References

Townes (1945) presented adult keys for 3 species, including *M. caelum*. Roback (1957) gave larval and pupal keys for 2 Nearctic species (p. 108). Pinder (1976) discussed the tendency toward the development of the tripartite median tooth on the labial plate of the larva. Walshe (1951) described the larval feeding mechanism for *Microtendipes pedellus*.



antenna

antenna      labial plate      mandible

### Generic Characters

Labial plate with convex anterior margin, a small pale median tooth and 6 pairs of oblique pointed lateral teeth; antenna with 5 segments, basal segment shorter than the combined length of the remaining segments; mandible with 4 inner teeth; small larvae (body length about 4.0 mm).

### Specific Characters

Labial plate with a pale median tooth recessed between the 1st laterals, its width less than the combined width of the 1st and 2nd laterals; paralabial plates longer than the width of the labial plate; mandible pale, with a dark inner dome of 4 small teeth; premandible with 4 teeth; ratio of antennal segments 23:10:3:10:4 (note short 3rd segment).

### Taxonomic Status

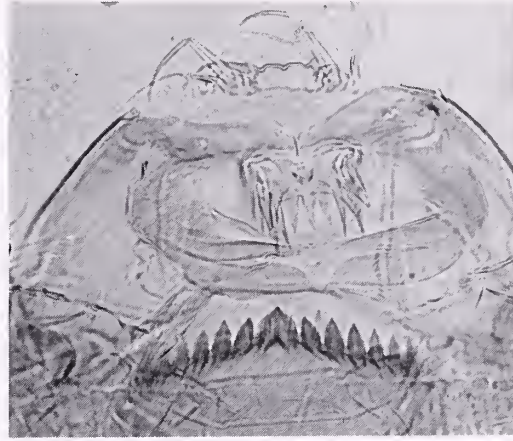
Poor. There are no keys to differentiate larvae of the 3 species listed in Sublette and Sublette (1965). Larvae will key out near *Cryptochironomus* in many keys (Johannsen, 1937b; Roback, 1957; and Mason, 1973), but will key correctly to genus in Beck (1976). The adults of 3 species will key in Townes (1945, p. 34) under the name *Kribioxenus*.

### Distribution and Ecology

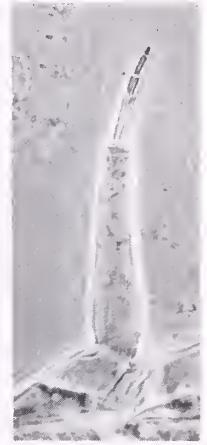
This species was encountered in swift-flowing, pollution-free rivers and streams. It was usually found on multiplates in areas where species richness was above 30 and species diversity was above 3.00.

### References

See above.



labial plate



antenna

### Generic Characters

Labial plate with 6-7 pairs of oblique, pointed lateral teeth, gradually diminishing in size; median tooth of labial plate single or double; paralabial plates with undulate anterior margin; basal segment of maxillary palps less than  $\frac{1}{2}$  as long as basal antennal segment; antennae with 5 segments.

### Specific Characters

Labial plate slightly convex, subequal in width to length of paralabial plates and with 15 teeth, median tooth peaked and about twice as wide as 1st laterals, 7th lateral tooth (on each side) pale and inconspicuous; mandible with 2 small inner teeth; premandible bifid; proportions of antennal segments 95:28:10:12:3.

### Taxonomic Status

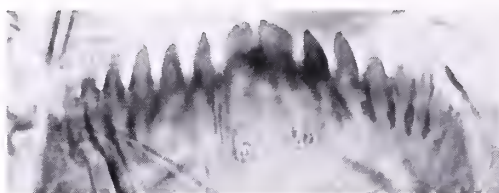
Fair. Beck and Beek (1969) gave a key for 8 species of *Parachironomus* from Florida, but many Nearctic species are not included. Reared material is still necessary for species identification. This species keys to *Harnischia abortiva* in Roback (1957, p. 100). Adults may be keyed in Townes (1945) under the genus *Harnischia*.

### Distribution and Ecology

This species was found on multiplates in all but one river system. It appears to be tolerant of most toxic and organic wastes, and is most often found in situations where more sensitive species have been repressed. Mason et al. (1971) provisionally classified *Parachironomus abortivus* gr. as facultative. Our surveys have shown that when found in abundance with *Dicrotendipes nervosus* Type II and several species of oligochaetes, *Parachironomus abortivus* can indicate combined toxic and organic wastes. Coffman (1978) listed 4 ecological references for *Parachironomus*.

### References

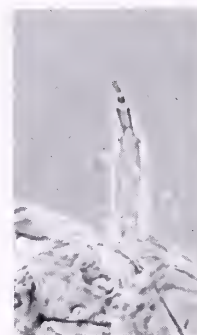
Townes (1945) keyed adults under the name *Harnischia*. Beck and Beck (1969) keyed larvae of 8 Florida species of *Parachironomus*. Lehmann (1970) revised the European species (17) of *Parachironomus*. Saether (1977) provided a satisfactory key to genera of the *Harnischia* complex.



labial plate



premandibles



antenna

### Generic Characters

Labial plate with 6-7 pairs of oblique, pointed lateral teeth, gradually diminishing in size; median tooth of labial plate single or double; paralabial plates with undulate anterior margin; basal segment of maxillary palp less than  $\frac{1}{2}$  as long as basal antennal segment; antenna with 5 segments.

### Specific Characters

Median tooth of labial plate cleft and 3 times as wide as 1st laterals; larva similar to *P. pectinatellae* but differing in the following respects (Dendy and Sublette, 1959): premandible with 4 large blades (rather than 3); 1st lateral tooth of labial plate not shorter than 2nd lateral tooth; paralabial plates about as long as width of labial plate; proportions of antennal segments 15:4:1:3:1.

### Taxonomic Status

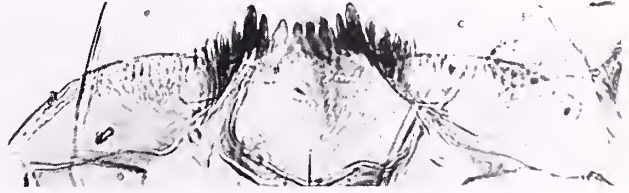
Fair. Some larvae will key in Beck and Beck (1969), but reared material is needed for most. The larva of this species keys to *Harnischia* in Roback (1957), but does not key to species. Adults will key in Townes (1945, pp. 153-155) under the name *Harnischia*.

### Distribution and Ecology

This less common species of *Parachironomus* was never found in great abundance, and was almost always accompanied by the sibling species, *P. abortivus*. Since its ecological preferences are quite similar to the more common *P. abortivus*, it is of limited value in water quality studies.

### References

Mason's 1968 photograph labelled *Chironomus* (*Cryptochironomus*) *pectinatellae* is probably *P. frequens*, based on the premandible and 1st lateral tooth of the labial plate. Beck and Beck (1969) key larvae for 8 Florida species of *Parachironomus*. For additional references, look under *P. abortivus*.



labial plate, paralabials

6-segmented  
antenna



### Generic Characters

Small larvae (body length 4.5-6.5 mm); antennae 6-segmented; labial plate with 16 teeth, the 4 middle teeth pale and recessed.

### Specific Characters

3rd lateral teeth of labial plate longer than other teeth, margin between them evenly concave; paralabial plates as long as width of labial plate and with widely spaced striations near the anterior margin; mandibles with 2 inner teeth and 1 false tooth; premandibles bifid.

### Taxonomic Status

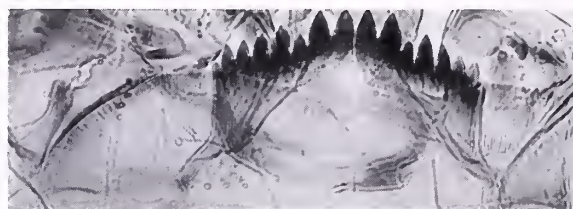
Fair. Although this species has been well studied, the larvae of 6 other North American species in this genus are unknown (Ward and Cummins, 1978). This larva will key to *Paratendipes* sp. 1 in Oliver et al. (1978). The adults of 6 Nearctic species may be keyed in Townes (1945).

### Distribution and Ecology

This species has been reported in a variety of habitats, from riffle areas to ponds. Our collections using multiplate samplers found it to occur in small, clean, swift-flowing streams. In streams, its greatest abundances were found to be in areas of slack current or in other depositional areas where fine detritus accumulated, on which the larvae feed (Ward and Cummins, 1978). This study also showed that during 75% of its life cycle, *Paratendipes albimanus* is so small as to easily pass through a U.S. No. 60 sieve, and is thus often eliminated by sampling bias.

### References

Ward and Cummins (1978) discussed the natural history, reviewed the pertinent literature, and illustrated the labial plate, antenna, and mandible of all 4 larval instars of *Paratendipes albimanus*. Roback (1974) gave chemical data for one collection site.



labial plate, paralabials

mandible



antenna

### Generic Characters

Labial plate with 16 teeth, median teeth even with or shorter than 1st laterals, 2nd laterals shorter than 1st and 3rd laterals; antennae 5-segmented and usually shorter than mandible; mandible with a notch between basal tooth and base of mandible; antennal blade shorter than antennal segments 2-5 (compare with *Tribelos*).

### Specific Characters

Labial plate with median and 1st lateral teeth equal in length; paralabial plates as long as width of labial plate, with striations strongest near the anterior margin; mandible with 3 inner teeth and deep notch on the inner margin; premandibles bifid; antennal ratio 1.3-1.4; basal antennal segment about 3 times as long as wide.

### Taxonomic Status

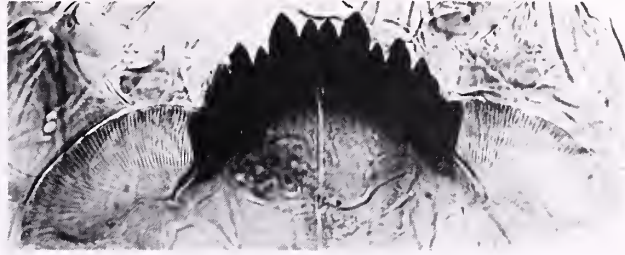
Fair. Larvae cannot be determined to species without associated adults. Adults of 8 species in this genus (including *P. dyari*) key in Townes (1945) under the name *Tanytarsus* (*Tanytarsus*).

### Distribution and Ecology

Beck (1977) classified the genus *Phaenopsectra* as scavengers, and occurring on, rather than in, substrates. We have found this species in a variety of habitats, but never in great abundance. It apparently has a wide range of tolerances, since it has been collected in several areas polluted with toxic and organic wastes. Mason et al. (1971) provisionally classified *Phaenopsectra* as pollution-sensitive, but our species appears to be facultative.

### References

Roback (1957) differentiated larvae of *P. obediens* and *P. flavipes* as *Tanytarsus* (*Tanytarsus*).



labial plate, paralabials

antenna,  
mandible



### Generic Characters

Labial plate with 16 teeth, median teeth even with or shorter than 1st laterals, 2nd laterals shorter than 1st and 3rd laterals; antennae 5-segmented and usually shorter than mandible; mandible with a notch between basal tooth and base of mandible; antennal blade shorter than antennal segments 2-5 (compare with *Tribelos*).

### Specific Characters

Labial plate with median and 2nd lateral teeth shorter than 1st laterals, 6th laterals small and inconspicuous; mandibles with short apical tooth and 3 inner teeth (middle of these smallest), notch on inner margin smaller than in *P. prob. dyari*; length of paralabial plates equal to width of labial plate; antennal ratio about 1.0; basal antennal segment short, about twice as long as wide.

### Taxonomic Status

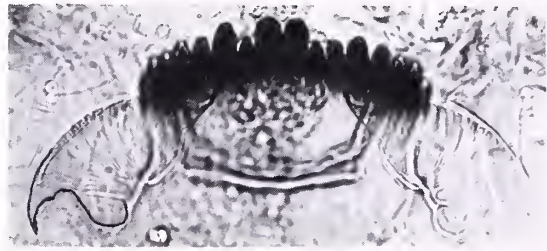
Fair. This larva may be distinctive enough to be determined without associated adults (Roback, 1957, pp. 121-122). Adults may be keyed in Townes (1945) under the name *Tanytarsus* (*Tanytarsus*).

### Distribution and Ecology

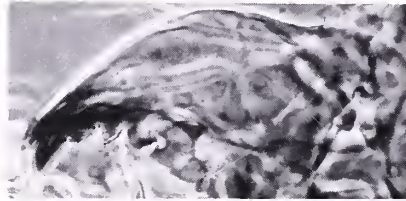
This species was found infrequently and usually in large rivers. Its distribution does not seem to be dependent upon water quality.

### References

Townes (1945) keyed adults of 8 species as *Tanytarsus* (*Tanytarsus*). Roback (1957) differentiated larvae of *P. obediens* and *P. flavipes* as *Tanytarsus* (*Tanytarsus*).



labial plate, paralabials



mandible



### Generic Characters

Labial plate usually convex and with 14-16 dark teeth (in one species, concave and with 10 or fewer teeth); paralabial plates separated, without anterior undulations and usually with distinct striations; antenna with 5 segments, sometimes apparently 4-segmented; mandible with 3 inner teeth and 1 false tooth; premandibles usually bifid, occasionally simple or with small 3rd tooth.

### Specific Characters

Labial plate with 16 teeth, 1st lateral teeth shorter than median and 2nd lateral teeth; paralabial plates with enlarged, rounded posterior lobes and with both the lateral and median apices tapering to a fine point; 3rd antennal segment about  $\frac{1}{3}$  as long as 2nd segment; Lauterborn organ not longer than 3rd antennal segment.

### Taxonomic Status

Fair. Maschwitz (1976) revised the subgenus *P. (Polypedilum)* and included keys for larvae, pupae and adult males. Larvae of half of the 30 species are known; associated pupae and adult males are therefore desirable. Roback (1957) has larval and pupal keys for 11 species. Townes (1945) has keys for adults of 38 species,

### Distribution and Ecology

*Polypedilum* is the most common genus of Chironomidae occurring in multiplate samples, and *P. convictum* is the most common species, being found at over 90% of the sampling sites. The larvae are filter-feeders, and their occurrence seems to be governed more by current speed and the amount of suspended food particles than by water quality. It is usually found with *Rheotanytarsus exiguus*, *Cheumatopsyche* sp., and *Nais communis*, a community indicative of an abundance of suspended foodstuffs.

### References

Maschwitz (1976) recently revised the subgenus *P. (Polypedilum)*. Coffman (1978) listed 12 references containing ecological information for *Polypedilum*.



premandible

labial plate

### Generic Characters

Labial plate usually convex and with 14-16 dark teeth (in one species, concave and with 10 or fewer teeth); paralabial plates separated, without anterior undulations and usually with distinct striations; antenna with 5 segments, sometimes apparently 4-segmented; mandible with 3 inner teeth and 1 false tooth; premandibles usually bifid, occasionally simple or with small 3rd tooth.

### Specific Characters

Labial plate with 16 teeth uniformly diminishing in size laterally; paralabial plates at least  $2\frac{1}{2}$  times as long as distance between them, and longer than width of labial plate; 2nd antennal segment about as long as combined length of segments 3-5.

### Taxonomic Status

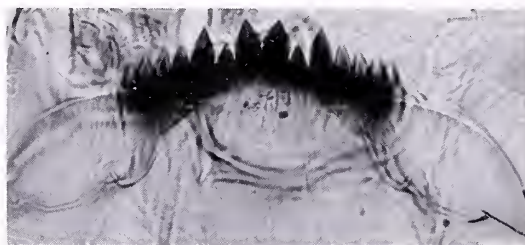
Fair. The larva will key in Maschwitz (1976); associated pupae and adult males can also be keyed there for verification. The larva will key to *P. fallax* in Roback (1957) and Beck (1976) and to *P. laetum* in Oliver et al. (1978). Pupae of *P. fallax* will key in Roback (1957). Adults may be determined in Townes (1945).

### Distribution and Ecology

This species has been found in a wide range of ecological conditions, but was rarely found in numbers exceeding 10 individuals. Mason (1974) ranked *P. fallax* as relatively pollution tolerant, but our data tends toward a classification as facultative, since it is often present at pristine sites as well as polluted ones.

### References

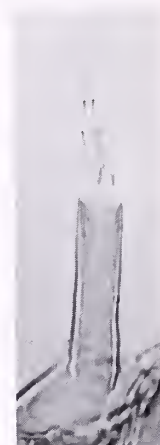
Maschwitz (1976) recently revised the subgenus *P. (Polypedilum)*. Coffman (1978) listed 12 references containing ecological information for *Polypedilum*.



labial plate, paralabials



premandibles



### Generic Characters

Labial plate usually convex and with 14-16 dark teeth (in one species, concave and with 10 or fewer teeth); paralabial plates separated, without anterior undulations and usually with distinct striations; antenna with 5 segments, sometimes apparently 4-segmented; mandible with 3 inner teeth and 1 false tooth; premandibles usually bifid, occasionally simple or with small 3rd tooth.

### Specific Characters

Labial plate with 16 teeth, 1st lateral teeth shorter than median and 2nd lateral teeth; paralabial plates without extended lateral tips or enlarged basal lobes (compare with *P. convictum*); 3rd and 4th antennal segments subequal in length; Lauterborn organs distinct, about  $\frac{1}{2}$  as long as 3rd antennal segment; premandibles with a small 3rd tooth basally.

### Taxonomic Status

Fair. This larva will key to species in Roback (1957), Beck (1976) and Maschwitz (1976), but associated material should be used to verify the determinations whenever possible. Roback's (1957) larval key contains 11 species of *Polypedilum*; Townes' (1945) key for adults contains 38 species. Maschwitz (1976) contains the most complete treatment.

### Distribution and Ecology

This companion species to *P. convictum* is less common, and seems to differ slightly in ecological preferences. *P. illinoense* usually occurs with *P. convictum* in lesser numbers, but occasionally fills the niche when *P. convictum* is eliminated by toxic problems. This suggests a wider range of environmental tolerance for *P. illinoense*. Roback (1974) reported *P. illinoense* occurring at the following environmental extremes: pH less than 4.5, pH greater than 8.5, alkalinity greater than 210 ppm, chloride greater than 1000 ppm, chloride greater than 2000 ppm plus magnesium greater than 150 ppm, iron greater than 5.00 ppm, sulfate greater than 400 ppm, and BOD greater than 5.9 ppm. Paine and Gauvin (1956) found *P. illinoense* to be an indicator of an unpolluted habitat.

### References

Maschwitz (1976) recently revised the subgenus *P. (Polypedilum)*. Coffman (1978) listed 12 references containing ecological information for *Polypedilum*.



antenna

labial plate, paralabials

### Generic Characters

Labial plate usually convex and with 14-16 dark teeth (in one species, concave and with 10 or fewer teeth); paralabial plates separated, without anterior undulations and usually with distinct striations; antenna with 5 segments, sometimes apparently 4-segmented; mandible with 3 inner teeth and 1 false tooth; premandibles usually bifid, occasionally simple or with small 3rd tooth.

### Specific Characters

Labial plate with 16 teeth, 1st lateral teeth shorter than median and 2nd lateral teeth; dark pigmentation of labial plate usually extending well posterior from teeth; paralabial plates longer than width of labial plate and without enlarged basal lobes; antenna apparently 4-segmented, segments 3-5 greatly reduced.

We have reared several species of *P. nr. scalaenum*, but cannot distinguish the larvae.

### Taxonomic Status

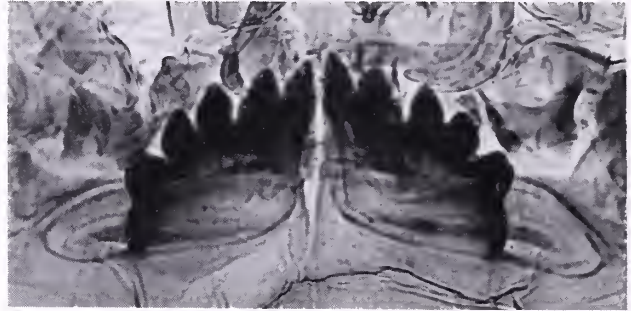
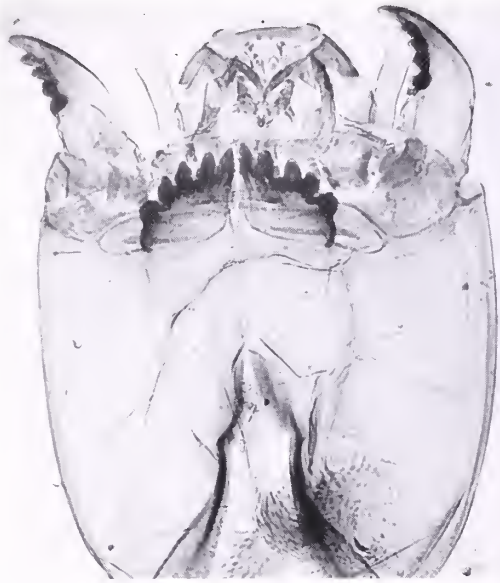
Fair. This will key to *P. scalaenum* in Roback (1957) and to *P. halterale* in Beck (1976). Townes (1945) created the subgenus *Tripodura* for 15 similar species of *Polypedilum* and Maschwitz (1976) provisionally retained its usage. Associated adults are needed for species identification, and may be keyed in Townes (1945, pp. 37-38).

### Distribution and Ecology

Roback (1974) listed *Polypedilum nr. scalaenum* as occurring at pH less than 4.5 and at iron greater than 5.0 ppm. Because of problems in identifying the larvae of this subgenus, our data is still insufficient to provide clear distributional patterns at the species level. However, the few collecting records available indicate it may be tolerant to several types of poor water quality.

### References

Roback (1957) gave larval and pupal keys for 11 species of *Polypedilum*, including *P. scalaenum*. Maschwitz (1976) included 5 species of the subgenus *Tripodura* in his larval key for *Polypedilum*. Coffman (1978) listed 12 ecological references for *Polypedilum*.



labial plate

paralabial plates

### Generic Characters

Paralabial plates long and narrow, almost touching medially; labial plate dark with 9-13 teeth, median tooth simple, 2nd lateral teeth (when 11-13 teeth) reduced, 5th and 6th lateral teeth often fused; mandibles light with 3 inner teeth and 1 false tooth; premandibles bifid; antennae 5-segmented on low tubercle with small spur or point (Saether, 1977).

### Specific Characters

Labial plate with 13 teeth, median rounded, distinctly higher and wider than 1st lateral teeth; 2nd lateral teeth greatly reduced; 5th and 6th lateral teeth fused, appearing as a single, wide bifid tooth; paralabial plates 4 times as long as wide; antennal ratio 2.4; head lacking pigmentation.

### Taxonomic Status

Fair. 13 Nearctic species have been described, and the larvae of 7 of these are known. "*Pseudochironomus*. . . is a well-defined homogeneous genus in all stages" (Saether, 1977). We have reared *Pseudochironomus banksi*, but this is not the species found on our multiplate samplers. Larvae will key to genus in most larval keys. Adults may be keyed in Townes (1945).

### Distribution and Ecology

This taxon occurred sporadically throughout our sampling network, and was found in some areas affected by toxic wastes. It was often found along with dense populations of filter-feeding insects (*Rheotanytarsus exiguus* group or net-spinning caddisflies, Trichoptera:Hydropsychidae) in waters containing high amounts of suspended organic particulates. Saether (1977) wrote of this genus, "Species of the genus appear to be similar ecologically. All species live in the littoral zone of primarily meso-oligotrophic lakes or in larger, slow-flowing rivers. The larvae seem to prefer a sandy or gravelly substrate or other firm substrates overgrown by algae. Their food consists of detritus and periphyton."

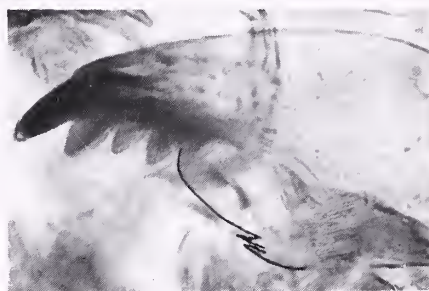
### References

Saether (1977) summarized the genus and provided keys for known larvae, pupae and adults. Roback (1957) gave a larval key for 3 species (pp. 107-108). Townes (1945) gave an adult key for 10 species (pp. 14-15).

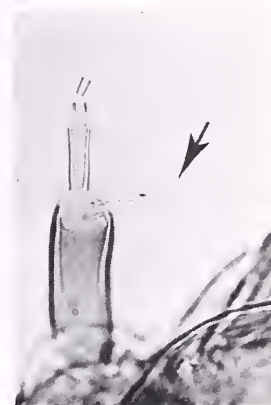
## *Tribelos jucundus* (Walker)



labial plate



mandible



antennal  
blade

antenna

### Generic Characters

Labial plate with 16 teeth, 2nd lateral teeth shorter than 1st and 3rd laterals, median teeth equal to or slightly shorter than 1st laterals; antennae 5-segmented, shorter than mandible; mandible without a notch between basal tooth and base of mandible; antennal blade longer than antennal segments 2-5.

### Specific Characters

3rd antennal segment short, about as long as wide; proportions of antennal segments 70:30:6:8:4; labial plate with median teeth shorter than 1st laterals; paralabial plates longer than width of labial plate, with striations strongest near center and also near anterior margin; mandible with 3 inner teeth and 1-2 serrations; premandibles bifid.

### Taxonomic Status

Fair. This larva keys to *Tanytarsus* (*Tribelos*) *jucundus* in Roback (1957) and to *Tribelos jucundus* in Beck (1976). Because not all species are included in the larval keys, determinations should be verified by identifying associated adults in Townes (1945, pp. 66-71).

### Distribution and Ecology

This species was found in small numbers in most river systems sampled, under a wide range of ecological conditions. Roback (1974) listed this species as occurring at pH greater than 8.5, and at dissolved oxygen levels below 4 ppm. Beck (1977) listed it as epibenthic (occurring on the substrate) or epilithic (occurring on rocks).

### References

See above.

## SUBFAMILY CHIRONOMINAE

### TRIBE TANYTARSINI

#### Distinguishing characteristics

The larvae have a pair of prominent striated paralabial plates that may be nearly touching or widely separated. The antennae are long and slightly curved, bear prominent Lauterborn organs, and are mounted on a tubercle that is longer than wide (Fig. 5d).

#### Taxonomy

Coffman (1978) listed 11 genera of Nearctic Tanytarsini, and estimated 69-137 or more species occur in North America. Very few species can be identified with certainty, even with associated pupal and adult material. The Sublettés are preparing a revision of this tribe. At present, much of the taxonomic information concerns the European fauna, and even there, the immature stages are poorly known. In the genus *Tanytarsus*, for example, larval descriptions are available for only 7 of the 53 species known from Europe (Reiss and Fittkau, 1971). Roback's (1957) larval and pupal keys are useful for separating some species or species groups, but his use of the genus *Calopsectra* is no longer appropriate. Most of his group names are now the proper generic names (e.g. his *Calopsectra* group *Paratanytarsus* is now the genus *Paratanytarsus*). One important exception is his group *Calopsectra*, which is now the genus *Tanytarsus*.

We have found prepupae of this tribe to be particularly valuable because the pupae are much easier to distinguish than the larvae and because we have much less success in rearing members of this tribe than we do with most other chironomids.

#### Biology

The larvae are generally burrowers or clingers, and many species build cases out of sand, silt and/or detritus. Some cases are affixed to the substrate (as in *Rheotanytarsus*) and others are carried around with the larvae (as in *Zavrelia*). Many species feed on microorganisms and detritus through filtering and gathering; a few species of *Tanytarsus* are scrapers (Coffman, 1978). The feeding mechanism of *Rheotanytarsus* is described by Walshe (1951).

After larval taxonomy is improved, a good many species may be found to have narrow environmental tolerances and therefore be useful as indicator organisms. At present, so few larvae can be identified accurately that little information is available regarding species' tolerance limits. Larvae of the *Rheotanytarsus exiguus* group thrive in lotic areas with excessive amounts of organic particulates and occasionally reach densities of over 30,000 individuals m<sup>2</sup> on multiplate samplers.



labial plate



spur of antennal tubercle

### Generic Characters

Basal tubercle of antenna with apical spur; parala-bial plates nearly meet at midline; Lauterborn or-gan less than  $\frac{1}{5}$  as long as its petiole; petiole of Lauterborn organ longer than antennal segments 3-5.

### Specific Characters

1st antennal segment 2.5 to 3.0 times longer than 2nd segment; spur on antennal tubercle .013-.014 mm in length; median tooth of labial plate with light center.

### Taxonomic Status

Poor. This will key to *Micropsectra polita* in Roback (1957) and to *M. sp. 2* in Oliver et al. (1978). Roback's (1957) larval and pupal keys for the genus (as Group *Micropsectra*) include 9 and 8 species, respectively. It is a large genus, with about 40 species in Europe (Reiss, 1969). Adult identifications will be possible when the Sublettles' revision of the Tanytarsini is completed.

### Distribution and Ecology

We found this taxon only in clean waters of small streams and moderate-sized rivers. Roback (1957) found *Calopsectra polita* in streams with moderate to rapid flow and where the general insect fauna was poor to good. Our records support Beck's (1977) listing of this species as saprophobic and rheobiontic.

### References

There are at present no comprehensive references for Nearctic *Micropsectra*. S w dal (1976) revised the *notescens*-group for the Palearctic region, and included keys for adult males and pupae. He observed that the larvae are too poorly known to permit reliable identification. Reiss (1969) revised the European species of the *attenuata*-group (adult males and pupae).



labial plate



antenna

### Generic Characters

Lauterborn organs large, located on the end of the 2nd antennal segment, with petioles very short or lacking; paralaial plates nearly meeting at midline; median tooth of labial plate uniformly dark and simple; pecten epipharyngis composed of 3-5 simple teeth.

### Specific Characters

Larvae cannot be distinguished. We have collected at least 2 species, which are separated on the basis of pupal characteristics.

### Taxonomic Status

Poor. This larval type keys to *Calopsectra dissimilis*, *C. boiemica* (Group *Paratanytarsus*) in Roback (1957) and to *Paratanytarsus* in Oliver et al. (1978). Pupae are much more distinctive than the larvae and 9 species can be keyed in Roback (1957). Thienemann (1951) separated the European fauna into major groups based on pupal characteristics.

### Distribution and Ecology

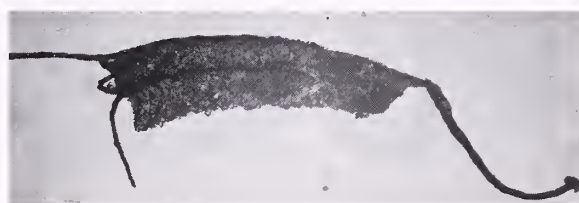
Based on our records, there are no water quality preferences evident at the generic level. Larvae of *Paratanytarsus* have been found in clean, cold-water streams and in slow-moving, eutrophic canals. Roback (1974) gave chemical data for habitats of 2 species near *dissimilis*. He found 1 species to be tolerant of high alkalinity (>210 ppm). Bell (1970) found that *P. dissimilis* could not complete its life cycle at pH values of 5.0 or lower. Cavanaugh and Tilden (1930) described the feeding and casebuilding habits of a species of *Paratanytarsus* as *Tanytarsus dissimilis*.

### References

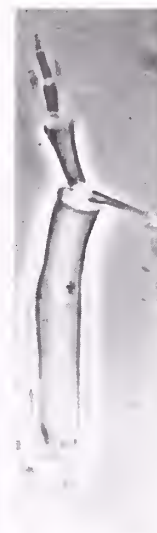
Roback (1957) gave keys for larvae (4 species) and pupae (9 species). Most of the information in Thienemann (1951) concerns the pupae of European *Paratanytarsus*.



labial plate



petiolate larval case



antenna

### Generic Characters

Paralabial plates nearly meet at midline; petioles of Lauterborn organs longer than 3rd antennal segment, but shorter than segments 3-5; Lauterborn organs approximately  $\frac{1}{3}$  as long as their petioles; case attached to substrate (not movable), with prominent ribs.

### Specific Characters

This group differs from the *exiguus*-group in that the larval case is supported by a long petiole; also, the middle tooth of the labial plate is deeply notched; paralabial plates about  $50 \mu$  long; antennal ratio less than 2.0.

(The body and head capsule of this group is substantially smaller than the specimens of the *exiguus*-group that we have collected.)

### Taxonomic Status

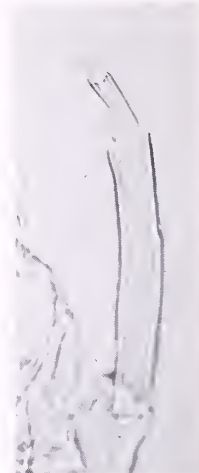
Poor. This larva keys to "*Rheotanytarsus exiguus* var. a" in Johannsen (1937b) based on the petiolate larval case. The pupa and adult key to *R. distinctissimus* in Lehmann (1971), but do not fit the descriptions for the species. At least 1 new species of this group has been found in eastern North America (Sublette and Sublette, personal communication).

### Distribution and Ecology

This taxon was dominant throughout a small, cool rapidly flowing stream and at numerous locations in moderate-sized, pollution-free rivers. It is also present in the cleanest reaches of two moderately polluted rivers. Based on these records, it appears to have potential as an indicator of clean water, particularly when it is one of the most abundant organisms.

### References

Johannsen (1937b) gave larval and pupal characters for separating *R. exiguus* var. a from *R. exiguus*, plus some biological information for both. Lehmann (1971) gave keys in both German and English for adult males and pupae of European *Rheotanytarsus* (8 species).



labial plate, paralabial plates

antenna

### Generic Characters

Paralabial plates nearly meet at midline; petioles of Lauterborn organs longer than 3rd antennal segment, but shorter than segments 3-5; Lauterborn organs about  $\frac{1}{3}$  as long as their petioles; case attached to substrate (not movable), with prominent ribs.

### Specific Characters

This group differs from the *distinctissimus*-group in that the case is attached lengthwise along one side; labial plate with entire or trifid median tooth; paralabial plates about  $70 \mu$  long; antennal ratio 2.0 or greater.

No characters are known for separating the larvae in this group. We have reared 3 species: *R. exiguus*, *R. nr. exiguus* and *R. nr. musicola*.

### Taxonomic Status

Poor. There are approximately 15 species of *Rheotanytarsus* in eastern North America (Sublette and Sublette, personal communication), but *R. exiguus* is the only species whose larva has been described.

### Distribution and Ecology

These organisms are one of the most common life forms throughout our sampling network, being absent only in a few grossly polluted areas, or in canal sections with negligible flow. They are dominant in areas with moderate flow and high amounts of suspended organic particulates. The larvae are basically filter-feeders and strain foodstuffs from the passing water with strands of salivary secretions strung between the arms of their cases (Walshe, 1951). *Rheotanytarsus exiguus* has been recorded from a wide range of environmental conditions (Roback, 1974; Beck 1977), thus the group should be considered facultative. However, these distributions undoubtedly represent several species, and once larval taxonomy is improved, narrower environmental requirements may be found for certain species.

### References

The immature stages of *R. exiguus* were described by Johannsen (1937b) and some distributional records are given by Roback (1957). Rosenberg and Wiens (1976) discussed the taxonomic status of *R. exiguus* and its usefulness in assessing oil pollution. Lehmann (1971) gave keys in German and English for adult males and pupae of European *Rheotanytarsus* (8 species), but *R. exiguus* was not included.



labial plate



antenna

### Generic Characters

Paralabial plates nearly meet at midline; Lauterborn organs small, less than  $\frac{1}{5}$  as long as their petioles; petiole of Lauterborn organ about as long as antennal segments 3-5; basal tubercle of antenna without spur at apex.

### Specific Characters

Petiole of Lauterborn organ short and thick, 1.1-1.4 times as long as antennal segments 3-5; head capsule dark; labial plate strongly arcuate and uniformly dark; outer edge of mandible rugose.

### Taxonomic Status

Fair. Although this larva cannot be determined in any existing keys, it is very distinctive and easily recognized. The dark head capsule makes this species easy to separate from other Tanytarsini even under a dissecting microscope. The pupa is also very distinctive and will key to *Calopsectra* sp. 1 in Roback (1957).

### Distribution and Ecology

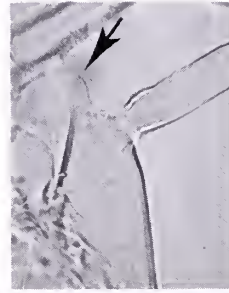
Our records generally confirm Roback's (1975) observations that this species is found in cool (15°C), clear, rapidly flowing small streams. We did find it scattered throughout two moderate-sized rivers, one essentially pollution free (Delaware River) and another mildly stressed with crude oil and domestic wastes (Allegheny River).

### References

Roback (1975) described the larva, pupa, and adults of both sexes, and gave some biological information for this species.



spur of  
antennal  
tubercle



antenna

### Generic Characters

Paralabial plates nearly meet at midline; Lauterborn organs less than  $\frac{1}{5}$  as long as their petioles; petiole of Lauterborn organ longer than antennal segments 3-5; basal tubercle of antenna generally without spur, if present, it is no longer than wide\*.

\*See taxonomic status for discussion of this character.

### Specific Characters

Basal antennal tubercle with small, pale apical spur, no longer than wide; median and 1st lateral teeth of labial plate project beyond other teeth and are uniformly colored; mandible with 2 dorso-mesal teeth and 2 additional teeth on dorsal side.

### Taxonomic Status

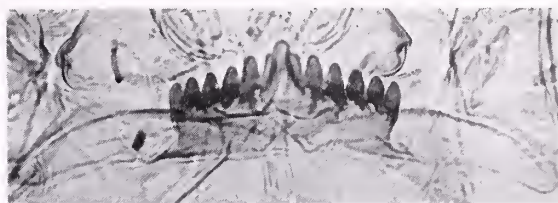
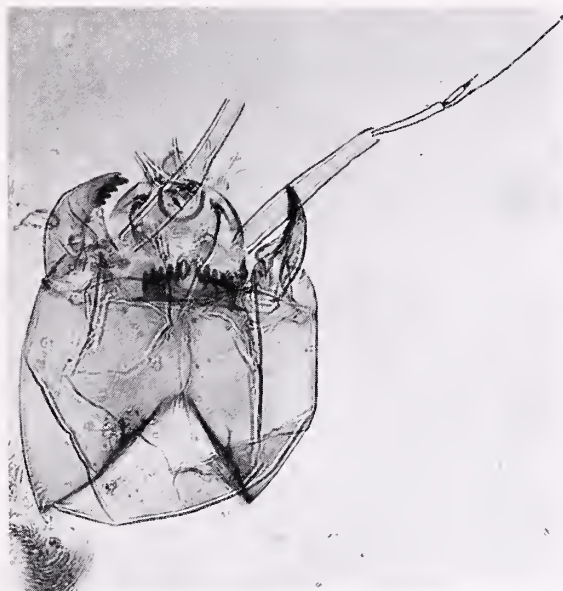
Poor. Because of the small spur on the antennal tubercle, this larva will key to *Micropsectra* in most larval keys, and appears quite close to Roback's (1957) *Calopsectra* sp. 7 (Group *Micropsectra*). However, the pupa and adult are *Tanytarsus glabrescens* group. Additional work is needed to better define generic limits for *Tanytarsus* and *Micropsectra*. This is a very large group in North America and even the adults are difficult to distinguish (Sublette, pers. comm).

### Distribution and Ecology

These larvae were found at approximately 2/3 of our 225 stations ranging from small, swiftly flowing streams to large rivers with both slow and swift flows. Roback (1957) found *Calopsectra* sp. 7 in streams with moderate to low flow, in some very turbid situations and where the general insect fauna ranged from good to excellent. This taxon appears to be facultative with regard to organic contamination, but does seem to be somewhat sensitive to toxic wastes. Narrower environmental tolerances may be found as the species are separated from one another.

### References

Reiss and Fittkau (1971) gave keys for adult males of European *Tanytarsus* and listed the available knowledge about larvae and pupae. The larvae of only 7 of the 53 European species are described in the literature.



labial plate



plumose setae of  
fronto-clypeus

### Generic Characters

Paralabial plates nearly meet at midline; Lauterborn organs small, less than  $\frac{1}{5}$  as long as their petioles; petiole of Lauterborn organ longer than antennal segments 3-5; basal tubercle of antenna without spur at apex.

### Specific Characters

Labial plate with 11 teeth, median tooth trident and with a light center; petiole of Lauterborn organ approximately 3.5 times as long as combined length of antennal segments 3-5; paralabial plates long ( $108 \mu$ ) and narrow; premandible with 4 apical teeth; front of head (fronto-clypeus) with a pair of plumose setae.

### Taxonomic Status

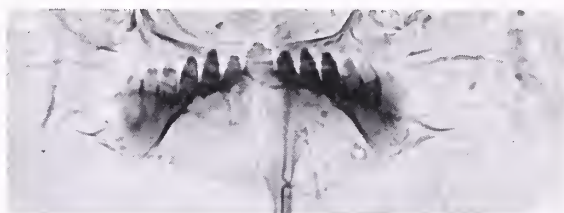
Poor. This larva will key to *Calopsectra guerla* in Roback's larval key (Group *Calopsectra*=*Tanytarsus*). *C. guerla* is one of the 4 species in Roback's (1957) larval key, and one of 11 species in his pupal key. However, the *guerlus*-group alone consists of about 12 species (Sublette and Sublette, personal communication), and at present not even the pupae and adults can be determined accurately.

### Distribution and Ecology

This taxon occurs over a wide range of physical habitats, including small, rapidly flowing headwater streams; large swiftly flowing rivers (such as the St. Lawrence); and some turbid, sluggish sections of the Erie Canal. It occurred in areas where the macroinvertebrate fauna was rich and varied, and also where it was restricted by organic and/or toxic wastes. Roback (1957) found *T. guerlus* (as *Calopsectra*) in ponds and streams and where the general insect fauna was both poor and diverse. "*Calopsectra* nr. *guerla*" appears on several of Roback's (1974) extreme tolerance lists including high pH ( $>8.5$ ), high alkalinity ( $>210$  ppm), and low dissolved oxygen ( $<4$  ppm). Based on existing records, this taxon is facultative, but narrower environmental tolerances may be found as the species are separated from one another.

### References

Roback (1957) described the larva and pupa of *Calopsectra guerla*. Reiss and Fittkau (1971) gave keys for adult males of European *Tanytarsus* (in English and German) and listed the available knowledge about larvae and pupae.



labial plate



antenna

### Generic Characters

The following characters apply to this taxon, and not the *Zavrelia* group as a whole (see taxonomic status). Paralabial plates widely separated and pointed at inner apices; Lauterborn organs large and alternate, located at different levels on 2nd antennal segment; distal Lauterborn organ originates from the end of the 2nd antennal segment; 2nd antennal segment about as long as combined length of segments 3-5.

### Specific Characters

None.

### Taxonomic Status

Poor. Even the genus of this specimen is uncertain. It belongs to the *Zavrelia* group because of the paralabial plates and Lauterborn organs (see above), but has some characters for both genera in the group, *Zavrelia* and *Stempellinella*. It will key to *Zavrelia* sp. in Roback (1957) due to the long, curved spine on the antennal tubercle, and also is very similar to *Stempellinella* sp. 1 in Oliver et al. (1978).

### Distribution and Ecology

This taxon was most abundant in small, cool headwater streams and also was found in small numbers in clean sections of moderate-sized rivers. Its numbers were reduced (although it was not eliminated) below the chlorinated effluent of a small, efficient sewage treatment plant. Our records agree with Beck's (1977) ranking of *Zavrelia* as rheobiontic and saprophobic. Roback (1974) gave one set of chemical values for a habitat of *Zavrelia* sp.

### References

Roback (1957) distinguished *Zavrelia* sp. from *Zavrelia pentatoma*? in his larval key. There is little information available regarding the North American fauna, including pupae and adults. Brundin (1948) gave larval and pupal keys and descriptions for *Zavrelia* and related genera (*Stempellina*, *Constempellina* and *Stempellinella*), but this taxon is not included.

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## GLOSSARY\*

- anaerobic — without free oxygen.
- annulate — with ring-like segments or divisions.
- antennal ratio — the length of the 1st antennal segment divided by the combined length of the remaining segments.
- anterior — front, in front of.
- apex — the end, tip, or outermost part.
- apical — at the end, tip, or outermost part.
- arcuate — bent like in a bow; arched.
- artificial substrate — a device exposed to a body of water for a specified period of time for the purpose of collecting aquatic organisms under more or less controlled sampling conditions.
- Aufwuchs — organisms occurring on, but not burrowing in, the substrate (=epibenthic).
- basal — at the base; near the point of attachment (of an appendage).
- benthic — of, relating to, or occurring at the bottom of a body of water.
- bifid — split into 2 branches or processes.
- biomonitoring — the evaluation of environmental conditions through the use of living organisms.
- biota — the living organisms of a region.
- cleft — partially split or divided; a V-shaped indentation.
- concave — rounded inward, like the inside of a circle.
- conical — cone-shaped.
- convex — rounded outward, like the outside of a circle.
- crenulate — with small scallops, each evenly rounded and rather deeply curved.
- cytological — of or relating to the study of cells.
- diagnostic character — a trait used for identifying a taxon.
- dorsal — top or uppermost.
- embenthic — occurring in (penetrating) the substrate and submerged objects.
- epibenthic — occurring on, but not penetrating, the substrate and submerged objects (=Aufwuchs).
- eutrophic — waters which are rich in nutrients and organic materials, therefore, highly productive.
- exuviae — the cast skin of an arthropod (including insects).
- facultative — capable of living under varied conditions; common in both clean and polluted waters.
- free-living — nonparasitic.
- granulate — roughened with granules or made up of distinct grains.
- gular length — the distance from the anterior-most point of the labial plate directly posterior to the occipital margin (see Fig. 5b).
- hair — a slender flexible filament of equal diameter throughout.
- hair pencil — a cluster of simple (unbranched) hairs or setae.
- lateral — on or pertaining to the side.
- limnobiontic — occurring only in standing (nonflowing) waters.
- limnophilous — occurring mainly in standing waters, but also found in flowing waters.
- lotic — flowing water habitats.
- macroinvertebrates — by practical definition those aquatic invertebrates generally visible to the unaided eye and retained by a U.S. Standard No. 30 sieve (0.59 mm mesh opening).
- median — middle; lying on the midline (of the body or body part).
- mesal — median.
- mesothermal — in general, pertaining to waters ranging in temperature between 15–30°C.
- mesotrophic — waters with moderate amounts of nutrients and organic materials.
- mesoxyphilous — occurring in waters with moderate concentrations of dissolved oxygen.

\* Definitions were compiled or modified from Beck (1977), Borror and DeLong (1971), Torre-Bueno (1937), and Matthews (1972). Anatomical terms are given on Figures 4–5 (pp. 17–18).

microphagous — feeding on small particles.  
 morphology — the science of form or structure.  
 multiplate — (also multiple-plate) — a type of artificial substrate sampler, usually consisting of a number of pressed hardboard plates mounted on a rod or bolt (see pp. 5–6).  
 Nearctic — the biogeographic region including Greenland and the continent of North America south to the Tropic of Cancer.  
 nodulate — knotty; having small knots or swellings.  
 oblique — slanted.  
 occipital — on or pertaining to the posterior part of the head.  
 oligotrophic — waters with low amounts of nutrients and organic matter, therefore supporting little organic production.  
 oligoxyphilous — characteristic of water having low dissolved oxygen concentration.  
 palmate — like the palm of a hand, with finger-like processes.  
 papilla (pl. papillae) — a soft, fleshy projection, usually small and nipple-like.  
 pectinate — with branches or processes like the teeth of a comb.  
 petiole — a stalk or stem by which something is attached.  
 phylogeny — the evolution of a genetically related group of organisms.  
 plumose — feather-like.  
 posterior — hind or rear.  
 predaceous — attacking and feeding on other animals.  
 proximal — nearer to the body or to the base of an appendage.  
 recessed — shorter than adjacent structures.  
 repress — to prevent the natural or normal occurrence (abundance) of (an organism).  
 retractile — capable of being drawn back or in.  
 rheobiotic — occurring only in flowing water.  
 rheophilous — occurring mainly in flowing water, but may also be found in standing water.  
 rugose — wrinkled.  
 saprophilic — usually occurring in organically polluted water, accompanied by brief periods of dissolved oxygen concentrations below 5.0 mg/l, pH changes of up to 2 units, and/or temperatures exceeding 25°C; also present in limited numbers in clean water habitats.  
 saprophobic — restricted to waters that have not been polluted organically.  
 saproxenous — occurring mainly in clean water habitats but also tolerant of some organic enrichment if the dissolved oxygen concentration remains above 5.0 mg/l and pH and temperature are not adversely altered.  
 sclerotized — hardened.  
 scythe — a mowing implement with a long, curving blade.  
 serrate — toothed along the edge like a saw.  
 sessile — attached directly; without a stem or petiole.  
 seta (pl. setae) — a slender, pale, hair-like appendage.  
 simple — without branches or subdivisions.  
 stellate — star-shaped.  
 striate — marked with fine parallel grooves or lines.  
 subequal — approximately or almost equal in size or length.  
 taxon (pl. taxa) — a kind of organism; any taxonomic unit of classification e.g. species, genus, family, order, etc.  
 toxic — poisonous.  
 trifid — split into 3 branches or processes.  
 truncate — cut off squarely at tip.  
 tubercle — a knoblike or rounded protuberance.  
 tubule — a soft, fleshy projection.  
 turbid — thick or opaque with suspended materials; roiled; muddy.  
 undulate — wavy.  
 ventral — lower or underneath; pertaining to the underside of the body.

## TANYPODINAE

| PAGE | Taxa included in this publication          | Determinations made with existing keys |                              |                      |                                        |
|------|--------------------------------------------|----------------------------------------|------------------------------|----------------------|----------------------------------------|
|      |                                            | Oliver et al. (1978)                   | Beck (1976)                  | Mason (1973)         | Roback (1957)                          |
| 20   | <i>Ablabesmyia mallochi</i>                | <i>Ablabesmyia</i> sp. 2               | <i>Ablabesmyia mallochi</i>  | <i>Ablabesmyia</i>   | <i>Pentaneura auriensis</i>            |
| 21   | <i>Ablabesmyia parajanta</i>               | <i>Ablabesmyia</i> sp. 1               | <i>Ablabesmyia parajanta</i> | <i>Ablabesmyia</i>   | <i>Pentaneura monilis</i> gr.          |
| 22   | <i>Labrundinia pilosella</i>               | <i>Labrundinia</i> sp. 1               | <i>Labrundinia floridana</i> | "Other Pentaneurini" | <i>Pentaneura</i> nr. <i>pilosella</i> |
| 23   | <i>Natarsia baltimoreus</i>                | <i>Natarsia baltimoreus</i>            | Does not key                 | "Other Pentaneurini" | <i>Anatopynia fastuosa</i>             |
| 24   | <i>Nilotanypus</i> prob. <i>fimbriatus</i> | <i>Nilotanypus fimbriatus</i>          | <i>Nilotanypus</i>           | "Other Pentaneurini" | <i>Pentaneura</i>                      |
| 25   | <i>Pentaneura</i> sp.                      | <i>Thienemannimyia</i> gr.             | <i>Pentaneura</i>            | "Other Pentaneurini" | <i>Pentaneura</i> sp. 3                |
| 26   | <i>Procladius sublettei</i>                | <i>Procladius</i> spp.                 | <i>Procladius</i>            | <i>Procladius</i>    | <i>Procladius culiciformis</i>         |
| 27   | <i>Thienemannimyia</i> gr.                 | <i>Thienemannimyia</i> gr.             | <i>Conchapelopia</i>         | "Other Pentaneurini" | <i>Pentaneura</i>                      |

## DIAMESINAE

| PAGE | Taxa included in this publication | Determinations made with existing keys |                    |                   |                              |
|------|-----------------------------------|----------------------------------------|--------------------|-------------------|------------------------------|
|      |                                   | Oliver et al. (1978)                   | Beck (1976)        | Mason (1973)      | Roback (1957)                |
| 29   | <i>Potthastia longimanus</i>      | <i>Potthastia longimanus</i>           | <i>Potthastia</i>  | <i>Potthastia</i> | <i>Potthastia longimanus</i> |
| 30   | <i>Sympotthastia</i> sp.          | <i>Potthastia</i> sp. 3                | <i>Lobodiamesa</i> | <i>Diamesa</i>    | <i>Diamesa fulva</i>         |

| PAGE | Taxa included in this publication                                  | Determinations made with existing keys       |                                                       |                                                   |                                                           |
|------|--------------------------------------------------------------------|----------------------------------------------|-------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------|
|      |                                                                    | Oliver et al. (1978)                         | Beck (1976)                                           | Mason (1973)                                      | Roback (1957)                                             |
| 32   | <i>Brillia flavifrons</i> ?                                        | <i>Brillia</i> sp. 1                         | <i>Brillia</i>                                        | <i>Brillia</i>                                    | <i>Brillia flavifrons</i> ?                               |
| 33   | <i>Cardiocladius obscurus</i> ?                                    | (Not included)                               | <i>Cardiocladius</i>                                  | <i>Cardiocladius</i>                              | <i>Cardiocladius</i>                                      |
| 34   | <i>Corynoneura celeripes</i>                                       | <i>Corynoneura</i> sp. 4                     | <i>Corynoneura</i>                                    | " <i>Thienemanniella</i> and <i>Corynoneura</i> " | <i>Corynoneura celeripes</i>                              |
| 35   | <i>Corynoneura taris</i>                                           | <i>Corynoneura</i> sp. 1&2                   | <i>Corynoneura</i>                                    | " <i>Thienemanniella</i> and <i>Corynoneura</i> " | <i>Corynoneura taris</i>                                  |
| 36   | <i>Cricotopus bicinctus</i>                                        | <i>Cricotopus bicinctus</i>                  | <i>Cricotopus bicinctus</i>                           | <i>Cricotopus</i>                                 | <i>Cricotopus bicinctus</i>                               |
| 37   | <i>Cricotopus intersectus</i> gr.                                  | <i>Cricotopus laricomalis</i> gr.            | <i>Cricotopus</i>                                     | <i>Cricotopus</i>                                 | <i>Cricotopus</i> nr. <i>trifasciatus</i> sp. 2           |
| 38   | <i>Cricotopus sylvestris</i> gr.                                   | <i>Cricotopus sylvestris</i> gr.             | <i>Cricotopus</i>                                     | <i>Cricotopus</i>                                 | <i>Cricotopus sylvestris</i> et al.                       |
| 39   | <i>Cricotopus tremulus</i> gr.                                     | <i>Cricotopus tremulus</i> gr.               | <i>Cricotopus</i>                                     | <i>Cricotopus</i> or <i>Orthocladius</i>          | <i>Cricotopus ceris</i> , <i>C. aratus</i>                |
| 40   | <i>Cricotopus trifascia</i> gr.                                    | " <i>Cricotopus</i> or <i>Orthocladius</i> " | <i>Cricotopus</i>                                     | <i>Cricotopus</i>                                 | <i>Cricotopus</i> sp. 1                                   |
| 41   | <i>Eukiefferiella bavarica</i> gr.                                 | <i>Eukiefferiella</i> sp. 7                  | <i>Eukiefferiella cerulescens</i> gp. (sic)           | <i>Eukiefferiella</i>                             | <i>Eukiefferiella</i> sp. 2                               |
| 42   | <i>Eukiefferiella claripennis</i> gr.                              | <i>Eukiefferiella claripennis</i> gr.        | <i>Epoicocladius</i>                                  | <i>Eukiefferiella</i>                             | <i>Eukiefferiella brevinervis</i>                         |
| 43   | <i>Eukiefferiella discoloripes</i> gr.                             | <i>Eukiefferiella</i> sp. 1                  | <i>Eukiefferiella</i>                                 | " <i>Eukiefferiella</i> , <i>Psectrocladius</i> " | <i>Eukiefferiella</i> sp. 1                               |
| 44   | <i>Eukiefferiella potthasti</i> gr.                                | (Not included)                               | <i>Eukiefferiella</i> or <i>Cardiocladius</i>         | <i>Cardiocladius</i>                              | <i>Eukiefferiella longicalcar</i>                         |
| 45   | <i>Eukiefferiella pseudomontana</i> gr.                            | <i>Eukiefferiella</i> sp. 4                  | <i>Epoicocladius</i>                                  | <i>Eukiefferiella</i>                             | <i>Eukiefferiella brevinervis</i>                         |
| 46   | <i>Heterotrissocladius marcidus</i> gr.                            | <i>Heterotrissocladius changi</i>            | <i>Heterotrissocladius</i>                            | <i>Heterotrissocladius</i>                        | <i>Metriocnemus stylatus</i>                              |
| 47   | <i>Nanocladius crassicornus</i>                                    | <i>Nanocladius</i> sp. 1                     | <i>Zalutschia</i>                                     | <i>Psectrocladius</i>                             | <i>Psectrocladius</i>                                     |
| 48   | <i>Nanocladius distinctus</i>                                      | <i>Nanocladius</i> sp. 1                     | <i>Zalutschia</i>                                     | <i>Psectrocladius</i>                             | <i>Psectrocladius</i>                                     |
| 49   | <i>Nanocladius minimus</i> ?                                       | <i>Nanocladius</i> sp. 1                     | <i>Zalutschia</i>                                     | <i>Psectrocladius</i>                             | <i>Psectrocladius</i>                                     |
| 50   | <i>Nanocladius rectinervis</i>                                     | <i>Nanocladius</i> sp. 1                     | <i>Zalutschia</i>                                     | <i>Psectrocladius</i>                             | <i>Psectrocladius</i>                                     |
| 51   | <i>Nanocladius spiniplenus</i>                                     | <i>Nanocladius</i> sp. 1                     | <i>Zalutschia</i>                                     | <i>Psectrocladius</i>                             | <i>Psectrocladius</i>                                     |
| 52   | <i>Orthocladius</i> ( <i>Euorthocladius</i> ) Type III sp.         | " <i>Cricotopus</i> or <i>Orthocladius</i> " | <i>Orthocladius</i>                                   | <i>Orthocladius</i>                               | <i>Hydrobaenus thienemanni</i>                            |
| 53   | <i>Orthocladius</i> ( <i>Orthocladius</i> ) prob. <i>annectens</i> | " <i>Cricotopus</i> or <i>Orthocladius</i> " | <i>Orthocladius</i> or <i>Cricotopus</i>              | <i>Cricotopus</i>                                 | <i>Hydrobaenus</i> sp. 2                                  |
| 54   | <i>Orthocladius</i> ( <i>Orthocladius</i> ) <i>obumbratus</i>      | " <i>Cricotopus</i> or <i>Orthocladius</i> " | <i>Orthocladius</i>                                   | <i>Orthocladius</i>                               | <i>Hydrobaenus obumbratus</i> et al.                      |
| 55   | <i>Parakiefferiella</i> sp.                                        | <i>Parakiefferiella</i> sp. 1                | <i>Zalutschia</i>                                     | " <i>Eukiefferiella</i> , <i>Psectrocladius</i> " | <i>Eukiefferiella coronata</i>                            |
| 56   | <i>Parametriocnemus lundbecki</i>                                  | (Not included)                               | <i>Parametriocnemus</i>                               | <i>Heterotrissocladius</i>                        | <i>Metriocnemus lundbecki</i>                             |
| 57   | <i>Psectrocladius psilopterus</i> gr.                              | <i>Psectrocladius simulans</i>               | " <i>Plecopteracoluthus</i> , <i>Psectrocladius</i> " | " <i>Eukiefferiella</i> , <i>Psectrocladius</i> " | <i>Psectrocladius elatus</i>                              |
| 58   | <i>Rheocricotopus</i> prob. <i>robaki</i>                          | <i>Rheocricotopus</i> sp. 2                  | <i>Rheocricotopus</i>                                 | <i>Trichocladius</i>                              | <i>Trichocladius</i> sp. 3                                |
| 59   | <i>Synorthocladius</i> nr. <i>semivirens</i>                       | <i>Eukiefferiella paucunca</i>               | <i>Eukiefferiella cerulescens</i> gp. (sic)           | <i>Eukiefferiella</i>                             | <i>Hydrobaenus semivirens</i>                             |
| 60   | <i>Thienemanniella</i> nr. <i>fusca</i>                            | <i>Thienemanniella</i> sp. 3                 | <i>Thienemanniella</i>                                | " <i>Thienemanniella</i> and <i>Corynoneura</i> " | <i>Corynoneura</i> ( <i>Thienemanniella</i> ) sp. 2       |
| 61   | <i>Thienemanniella</i> prob. <i>xena</i>                           | <i>Thienemanniella</i> sp. 1                 | <i>Thienemanniella</i>                                | " <i>Thienemanniella</i> and <i>Corynoneura</i> " | <i>Corynoneura</i> ( <i>Thienemanniella</i> ) <i>xena</i> |

# CHIRONOMINI

| PAGE | Taxa included in this publication                               | Determinations made with existing keys                      |                                     |                         |                                                                 |
|------|-----------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------|-------------------------|-----------------------------------------------------------------|
|      |                                                                 | Oliver et al. (1978)                                        | Beck (1976)                         | Mason (1973)            | Roback (1957)                                                   |
| 63   | <i>Chironomus decorus</i> gr.                                   | <i>Chironomus plumosus</i> gr.                              | <i>Chironomus attenuatus</i>        | <i>Chironomus</i>       | <i>Tendipes decorus</i>                                         |
| 64   | <i>Chironomus riparius</i> gr.                                  | <i>Chironomus thummi</i> gr.                                | <i>Chironomus attenuatus</i>        | <i>Chironomus</i>       | <i>Tendipes riparius</i>                                        |
| 65   | <i>Cryptochironomus fulvus</i> gr.                              | <i>Cryptochironomus digitatus</i>                           | <i>Cryptochironomus fulvus</i>      | <i>Cryptochironomus</i> | <i>Cryptochironomus</i> nr. <i>fulvus</i>                       |
| 66   | <i>Dicrotendipes neomodestus</i>                                | <i>Dicrotendipes</i> sp. 1                                  | <i>Dicrotendipes neomodestus</i>    | <i>Dicrotendipes</i>    | <i>Tendipes</i> ( <i>Limnochironomus</i> ) <i>neomodestus</i>   |
| 67   | <i>Dicrotendipes nertosus</i> Type I                            | <i>Dicrotendipes nertosus</i>                               | <i>Dicrotendipes nertosus</i>       | <i>Dicrotendipes</i>    | <i>Tendipes</i> ( <i>Limnochironomus</i> ) <i>nertosus</i>      |
| 68   | <i>Dicrotendipes nertosus</i> Type II                           | <i>Dicrotendipes nertosus</i>                               | <i>Dicrotendipes nertosus</i>       | <i>Einfeldia</i>        | <i>Tendipes</i> ( <i>Limnochironomus</i> ) <i>nertosus</i>      |
| 69   | <i>Endochironomus nigricans</i>                                 | <i>Endochironomus</i> sp. 1                                 | <i>Endochironomus nigricans</i>     | <i>Endochironomus</i>   | <i>Tanytarsus</i> ( <i>Endochironomus</i> ) <i>nigricans</i>    |
| 70   | <i>Endochironomus subtendens</i>                                | <i>Endochironomus</i> sp. 1                                 | <i>Endochironomus</i>               | <i>Endochironomus</i>   | <i>Tanytarsus</i> ( <i>Endochironomus</i> ) <i>subtendens</i>   |
| 71   | <i>Glyptotendipes</i> ( <i>Phytotendipes</i> ) <i>lobiferus</i> | <i>Glyptotendipes</i> ( <i>Phytotendipes</i> ) sp. 1        | <i>Glyptotendipes</i>               | <i>Glyptotendipes</i>   | <i>Glyptotendipes</i> ( <i>Phytotendipes</i> ) <i>lobiferus</i> |
| 72   | <i>Harnischia curtilamellata</i>                                | <i>Harnischia curtilamellata</i>                            | <i>Paracladopelma</i>               | <i>Paracladopelma</i>   | <i>Harnischia nais</i>                                          |
| 73   | <i>Microtendipes caelum</i>                                     | <i>Microtendipes pedellus</i>                               | <i>Microtendipes</i>                | <i>Microtendipes</i>    | <i>Microtendipes tarsalis</i>                                   |
| 74   | <i>Nilothauma babiği</i>                                        | Couplet 19 (does not key)                                   | <i>Nilothauma</i>                   | <i>Cryptochironomus</i> | <i>Cryptochironomus</i>                                         |
| 75   | <i>Parachironomus abortivus</i>                                 | <i>Parachironomus</i> sp. 1                                 | <i>Parachironomus monochromus</i>   | <i>Parachironomus</i>   | <i>Harnischia abortiva</i>                                      |
| 76   | <i>Parachironomus frequens</i>                                  | <i>Parachironomus</i> sp. 1                                 | <i>Parachironomus pectinatellae</i> | <i>Parachironomus</i>   | <i>Harnischia</i>                                               |
| 77   | <i>Paratendipes albimanus</i>                                   | <i>Paratendipes</i> sp. 1                                   | <i>Paratendipes subaequalis</i>     | <i>Paratendipes</i>     | <i>Paratendipes albimanus</i>                                   |
| 78   | <i>Phaenopsectra</i> prob. <i>dyari</i>                         | <i>Phaenopsectra</i>                                        | <i>Phaenopsectra</i>                | <i>Phaenopsectra</i>    | <i>Tanytarsus</i> ( <i>Tanytarsus</i> ) <i>obediens</i>         |
| 79   | <i>Phaenopsectra flavipes</i>                                   | <i>Phaenopsectra</i>                                        | <i>Phaenopsectra</i>                | <i>Tribelos</i>         | <i>Tanytarsus</i> ( <i>Tanytarsus</i> ) <i>flavipes</i>         |
| 80   | <i>Polypedilum</i> ( <i>Polypedilum</i> ) <i>convictum</i>      | <i>Polypedilum</i> ( <i>Polypedilum</i> ) <i>illinoense</i> | <i>Polypedilum convictum</i>        | <i>Polypedilum</i>      | <i>Polypedilum</i> ( <i>Polypedilum</i> ) <i>convictum</i>      |
| 81   | <i>Polypedilum</i> ( <i>Polypedilum</i> ) <i>fallax</i> gr.     | <i>Polypedilum</i> ( <i>Polypedilum</i> ) <i>laetum</i>     | <i>Polypedilum fallax</i>           | <i>Polypedilum</i>      | <i>Polypedilum</i> ( <i>Polypedilum</i> ) <i>fallax</i>         |
| 82   | <i>Polypedilum</i> ( <i>Polypedilum</i> ) <i>illinoense</i>     | <i>Polypedilum</i> ( <i>Polypedilum</i> ) <i>ophiodes</i>   | <i>Polypedilum illinoense</i>       | <i>Polypedilum</i>      | <i>Polypedilum</i> ( <i>Polypedilum</i> ) <i>illinoense</i>     |
| 83   | <i>Polypedilum</i> ( <i>Tripodura</i> ) nr. <i>scalaenum</i>    | <i>Polypedilum</i> ( <i>Tripodura</i> ) sp. 1               | <i>Polypedilum halterale</i>        | <i>Polypedilum</i>      | <i>Polypedilum</i> ( <i>Tripodura</i> ) <i>scalaenum</i>        |
| 84   | <i>Pseudochironomus</i> sp.                                     | <i>Pseudochironomus fulviventris</i>                        | <i>Pseudochironomus</i>             | <i>Pseudochironomus</i> | <i>Pseudochironomus richardsoni</i> ?                           |
| 85   | <i>Tribelos jucundus</i>                                        | <i>Phaenopsectra</i> sp. 1                                  | <i>Tribelos jucundus</i>            | <i>Tribelos</i>         | <i>Tanytarsus</i> ( <i>Tribelos</i> ) <i>jucundus</i>           |

# TANYTARSINI

| PAGE | Taxa included in this publication         | Determinations made with existing keys |                       |                              |                                                                                               |
|------|-------------------------------------------|----------------------------------------|-----------------------|------------------------------|-----------------------------------------------------------------------------------------------|
|      |                                           | Oliver et al. (1978)                   | Beck (1976)           | Mason (1973)                 | Roback (1957)                                                                                 |
| 87   | <i>Micropsectra polita</i> <sup>p</sup>   | <i>Micropsectra</i> sp. 3              | <i>Micropsectra</i>   | <i>Micropsectra</i>          | Group <i>Micropsectra</i><br><i>Calopsectra polita</i> ,<br><i>Calopsectra</i> sp. F          |
| 88   | <i>Paratanytarsus</i> spp.                | <i>Paratanytarsus</i>                  | <i>Paratanytarsus</i> | <i>Rheotanytarsus</i> et al. | Group <i>Paratanytarsus</i><br><i>Calopsectra dissimilis</i> ,<br><i>Calopsectra boiemica</i> |
| 89   | <i>Rheotanytarsus distinctissimus</i> gr. | <i>Rheotanytarsus</i> sp. 1            | <i>Rheotanytarsus</i> | <i>Rheotanytarsus</i> et al. | Group <i>Rheotanytarsus</i><br><i>Calopsectra exigua</i>                                      |
| 90   | <i>Rheotanytarsus exiguus</i> gr.         | <i>Rheotanytarsus</i> sp. 1            | <i>Rheotanytarsus</i> | <i>Rheotanytarsus</i> et al. | Group <i>Rheotanytarsus</i><br><i>Calopsectra exigua</i>                                      |
| 91   | <i>Tanytarsus coffmani</i>                | Does not key                           | Does not key          | <i>Rheotanytarsus</i> et al. | Does not key                                                                                  |
| 92   | <i>Tanytarsus glabrescens</i> gr.         | <i>Micropsectra</i> sp. 2              | <i>Micropsectra</i>   | <i>Micropsectra</i>          | Group <i>Micropsectra</i><br><i>Calopsectra</i> sp. 7                                         |
| 93   | <i>Tanytarsus guerlus</i> gr.             | <i>Tanytarsus</i> sp. 1                | <i>Tanytarsus</i>     | <i>Rheotanytarsus</i> et al. | Group <i>Calopsectra</i><br><i>Calopsectra guerla</i>                                         |
| 94   | <i>Zavrelia</i> group sp.                 | <i>Stempellinella</i> sp. 1            | <i>Zavrelia</i>       | <i>Constempellina</i>        | Group <i>Zavrelia</i><br><i>Zavrelia</i> sp.                                                  |



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